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Volunteer Water Quality Monitoring Programs: An Assessment of Public Participation as a Means of Fostering Environmental Stewardship

Christopher Damon
University of Rhode Island

VOLUNTEER WATER QUALITY MONITORING PROGRAMS: AN ASSESSMENT OF PUBLIC PARTICIPATION AS A MEANS OF FOSTERING ENVIRONMENTAL STEWARDSHIP

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CHRISTOPHER DAMON

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CHRISTOPHER DAMON

APPROVED:

Thesis Committee

Major Professor

R. N. Burroughs

DEAN OF THE GRADUATE SCHOOL

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Abstract

Volunteer water quality monitoring organizations from across the country were surveyed (n=516) to determine the relationship between public involvement and the generation of stewardship within the community. Program coordinators were asked first to rate the level of stewardship values within the community, and then respond to questions covering four broad areas of public involvement: pre-existing conditions, public education, volunteer behavior, and communal involvement.

For each question, organizations were aggregated by response, and a frequency analysis was performed to discover the most common responses in each of the four public involvement categories. The mean of perceived stewardship values was graphed as a function of response for each question. To ascertain the significance of any differences in the means of perceived stewardship values, two types of significance tests were performed. Z (obtained) was used to establish significance for dichotomous questions, while a one-way ANOVA was performed on multiple choice questions. In addition, Scheffe's test for significance was used to isolate the differences when the one-way ANOVA indicated the presence of a statistically significant difference.

Results support both hypotheses that 1) volunteer monitoring organizations can influence perceived stewardship values by adopting a public involvement campaign; and 2) in locales where resource protection has been given little attention, public involvement activities were associated with higher perceived stewardship values, and provide a valid means to establish links between the community and the resource.

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Introduction

The continuing expansion of the environmental movement has increased the opportunities for public involvement through the use of volunteer water quality monitoring programs. There is, however, no definitive body of literature which has identified the possibilities of expanding the role of the volunteer programs to accomplish more than just cataloguing water quality information, specifically the building of public stewardship within the community.

Volunteer water quality monitoring simply means that volunteers are organized in an effort to not only determine the current status of local water bodies, but also to search for indications of point source and non-point source pollution inputs, which may be contributing to the degradation of local or regional water resources. Monitoring efforts are not designed to be a quick fix in limiting pollution problems, rather they require long-term commitments needed to sort through the dynamic trends associated with water chemistry data. Constituents being sampled may vary based on cycles associated with season, tide, or even the time of day. Kerr, Green, Lee, and Gold (1992) contend that a well organized and trained group of volunteers, using an approved quality assurance/quality control program, have the ability to collect high quality data. These data could be used to provide baseline conditions for a waterbody, allowing the identification of future changes in water quality.

Data collected by volunteers are being used by state and federal agencies, local governments, advocacy groups, and university scientists for purposes such as local decision-making, watchdogging, enforcement, and public education. These actions are applauded by many federal agencies including the Environmental Protection Agency (EPA).

The EPA became interested in the possibilities of volunteer monitoring after the passage of the Water Quality Act (WQA) of 1987. Passage of the WQA recognized the National Estuary Program, which encouraged public education and participation in the management of pollution problems, along with providing funds for lake clean-up and the assessment of non-point source pollution problems. The EPA surveyed a variety of volunteer organizations, and determined that they could be very useful for background mapping and problem identification (EPA, 1990).

Because such little information exists concerning the possibility of fostering communal stewardship through monitoring programs, a literature review was conducted in the quest for parallel research, and is located in Chapter 2. As stewardship evolves in a community, the traditional manner of thinking about a resource must be changed prior to altering behaviors. Because of this, the areas of immediate concern can be divided into three broad categories: public involvement, behavioral intervention mechanisms, and attitude/behavior (A/B) interactions. An understanding of public involvement will allow for the creation of programs supported by the community, while behavioral intervention mechanisms will serve as a guide for eliciting the desired changes. Directly related to behavioral intervention techniques are A/B studies. A knowledge of A/B

interactions will serve to highlight the causal forces determining attitude development, and the necessary linkages which will translate into practiced behaviors.

Hypotheses

This research is based upon two hypotheses:

1) The extent to which a volunteer monitoring program perceives their success at building stewardship within the community will depend upon:

a) how a community has traditionally utilized the resource; and/or

b) the scope of their public education program

For instance, volunteer monitoring programs implemented because of immediate concerns for resource quality are expected to have higher levels of communal stewardship than programs designed for simple baseline data gathering. Along this same line, monitoring programs which have made a conscious effort to diversify into different aspects of resource protection, including problem identification and mitigation, public education and involvement, advocacy, and legislative participation, will sense a greater perceived level of environmental stewardship within the community.

2) In areas where resource protection has traditionally been of little concern, such as in inner-city settings, programs which seek to involve the public through resource promotion and education will have a greater perceived sense of stewardship than groups which have not attempted to link the community to the resource.

As the reader will note, both hypotheses deal with how an organization *perceives* stewardship within their community. Because this study will solicit information from the head of a volunteer monitoring group rather than from each individual member, the results will reflect a program coordinators opinions. While this may be construed as

entering biases into the research due to the possible overzealous or self-serving nature of the respondents, these effects are not expected to have a detrimental effect on the outcome of this study.

Rather than interview thousands of individuals nationwide, this study seeks to ascertain the activity levels of numerous monitoring groups, and to interpret the results. It may be worth noting that the Environmental Protection Agency (EPA) has used these same practices to obtain descriptive information from volunteer monitoring groups nationwide, and has compiled and published the data in the *1994 EPA Guide to Volunteer Monitoring Organizations*. The validity of self-report data and the effects of social desirability on questionnaire responses will be discussed in greater depth in the methodology section.

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Literature Review

Public Involvement

The emergence of public involvement in resource management occurred during the 1970s via the Principals and Standards of the U.S. Water Resources Council, and is now required by federal law to be a component of the planning process for water resources development (Astrack, Asce, Baumann, and Reynolds, 1984). Since that time, a large body of literature has been written attesting to the importance of public input (Pierce and Doerksen, 1976; Rosenbaum, 1976; Hudspeth, 1986; Grisham, 1988; and Carroll and Hendrix, 1992). "Public" has been defined by Thomas (1990) as being all affected citizens from organized or unorganized groups that may provide useful information, or affect the eventual implementation of the future decision.

The reasons for involving the public are straightforward. Carroll and Hendrix (1992) used a case study approach to look at how the success of river protection programs was related to the level of local involvement offered by the managing federal agencies. Conclusions for the study stressed the need to develop a trust between the planning agency and local residents for river protection programs. This trust develops during the initial stages of planning, and has a direct bearing on future interactions. Initiating river protection usually requires the alteration of traditional uses of local resources. Because of this, the incorporation of local interests and concerns helps pave the way for successful agreements, free from belligerent opposition.

Volunteer monitoring organizations seeking to build stewardship within their communities will also have to change the manner in which the residents view the resource, so that damaging behaviors can be changed. An organization will not be able to instill stewardship simply by monitoring the resource and publishing "doom and gloom" reports. Rather, monitoring groups must allow an avenue through which a citizen's voice can be heard, and action can be taken.

Public Information

The successful incorporation of public involvement relies to a large extent upon the dissemination of information to the public, however, this important phase of project planning has traditionally been given a low priority by government officials and professionals (Grisham, 1988). The Institute for Participatory Planning (1978) cites many good reasons for establishing a well organized public information program. Some of the reasons are: a) to display the legitimacy of the proposed actions; b) to establish agency credibility, c) to accurately determine the effects of proposed plans by working with affected interests; and d) to garner communal support for the project. An additional point worth considering is that a lack of information causes people to look elsewhere for the answers they seek. This could lead to future difficulties if the information provided by alternative sources is incorrect (Grisham, 1988).

Information may be provided to the public in a variety of ways including publications and public meetings. Although neither of these are cheap, Grisham (1988) believes that the costs are far outweighed by the benefits of improved decision-making and the avoidance of costly opposition. For monitoring organizations, the distribution of accurate information to the public concerning resource condition and preferred

behavioral actions may build communal support by first displaying and explaining the need for action, and then asking for the community's help.

Motivation for Public Involvement

With an increase in public involvement comes the question of what motivates people to become involved initially. Studies both in the U.S. (Cole, 1969), and the U.K. (Committee on Public Participation and Planning, 1969) have shown rather disappointing results when citizens have been presented the opportunity of deciding their own fate. Contrary to the popular belief that all citizens need is opportunity, surveys of public participation programs continually show approximately a 10 percent involvement rate (National Opinion Polls Research Unit, 1975).

Looking for ways to combat this recurring problem, McKenzie (1981) has identified three main criteria for increasing involvement: 1) focusing the program towards individuals who may not have had experience in decision-making in the past, or those who lack the confidence and skills necessary for a group decision-making process; 2) encouraging the formation of informal groups of friends and neighbors where issues may be discussed in a casual manner; and 3) avoiding abstract goals, since people must be able to understand the program objectives before they will be considered important.

Based on these criteria, volunteer monitoring organizations hold a unique position in that they can easily address each of these concerns within their organizations. First, by their very nature, volunteer groups seek all that are interested regardless of past experiences. Training is provided to each individual to develop their confidence in the new skills, which should ultimately translate into an increased accuracy of the findings. Second, relationships which develop between volunteers create the informal groups where issues

and concerns may be discussed in a casual manner. Finally, the goals of individual groups presumably coincide with the information being utilized to recruit new volunteers. Individuals agreeing with the direction of the program are those which accept the role of volunteer monitors. While monitoring groups may be able to address these issues internally with relative ease, how they progress beyond their organizational boarders is an area to be explored in this study.

Behavioral Intervention

When considering expanding the role of volunteer monitoring, means of altering behavior must be taken into consideration, because the building of public stewardship hinges upon deviating from the traditional uses of local resources. Several of the most common forms of behavioral intervention are identified and critiqued below.

Persuasive Communication

The underlying assumption with persuasive communication is that belief in the need for change, coupled with the effectiveness of the proposed action will encourage the appropriate behavior (Cook and Berrenberg, 1981). Some aspects of persuasive communication fall into the category of fear arousal techniques, and research indicates (Higbee, 1969; and Leventhal, 1970) that there is a positive relationship between the level of fear and behavioral changes. Cook and Berrenberg (1981) point out, however, that the majority of the research into fear as a motivational technique has dealt with personal issues such as health, and it is unknown if the results will carry over into larger non-personal issues such as environmental problems. They also cite the context in which the information was obtained, and attitudes of the recipient as variables which will alter the effects of persuasive communication.

Another aspect of persuasive communication is aimed at people with pro-conservation attitudes that a) may not know of an existing problem, or b) do not connect an action with being conservation oriented. In these cases, information is distributed through a variety of sources, such as the mass media, in the hopes of invoking the appropriate behavior (Cook and Berrenberg, 1981).

One form of persuasive communication is to place "reminders" at key locations in order to solicit the preferred action. An example of this would be to place a "Please turn out the lights when done" message on the door of a frequently used room. Studies by Delprata (1977) and Winett (1978) indicate that the effectiveness of reminders can be enhanced by displaying the reminder at the source of action, as well as specifically stating who is responsible for taking the action and when it should occur. De Young (1993) views informational substitutes such as prompts as very unreliable. Not only does the effectiveness vary according to how convenient the requested action is, it also hinges upon factors such as the wording, placement, and periodicity between viewings of the prompt. In addition to this, the behavioral changes are not durable, that is to say, a removal of the prompt usually results in a reversal of desired behavior.

Positive Motivational Techniques

This category relies upon extrinsic motivation to entice or encourage the desired behavior. Encouragement can take the form of material or social incentives, and assumes that rewarded behavior will be repeated (Cook and Berrenberg, 1981). Examples of material incentives include monetary incentives such as the "buying back" of beverage cans, tax credits for installing conservation oriented items such as insulation,

and reductions in the interest rates on energy efficient home loans. Social incentives, on the other hand, are primarily oriented to providing social recognition and approval.

Although Birch and Veroff (1966) described a positive correlation between the size of the incentive and the degree of effort, De Young (1993) emphasizes the non-durability nature of incentives. Even though it is possible to change behavior quickly through the use of incentives, behavioral patterns quickly revert to baseline levels once the incentive is removed. An additional variable which may alter the effectiveness of an incentive program is the relationship of the cost of the incentive to the resource being consumed. If the incentive represents only a small increase in the amount of spendable income, it will appear trivial (Cook and Berrenberg, 1981).

Social Pressure and Disincentives

Just as it is possible to illicit the correct behavior from positive enforcement, negative stimuli may also be used to obtain the needed behavioral changes. Bandura (1969), however, lists three principal reasons for the complex and unpredictable nature of disincentives. First, it is possible that the punishment is only temporary in nature. This would tend to cause a suppression of behavior rather than an actual change. Second, the intended effects of the punishment may be minimized by the contempt an affected party feels towards the enforcement agency. Finally, punishment is generally effective only when coupled with a positive reinforcement associated with alternate behavioral patterns.

Although the use of punishing disincentives is not recommended in the literature on environmental psychology (Geller, Winett, and Everett, 1982), there are coercive manners that may be employed without directly punishing. These include the use of consumption

based-taxes, certain types of social pressures, and eliminating non-conserving behaviors from desirable activities (e.g., high occupancy vehicle lanes) (De Young, 1993).

De Young (1993) also asserts that coercive techniques produce behavioral changes that are as quick and reliable as positive enforcement, but there are additional complications caused by the psychological reactance theory. Psychological reactance becomes an issue when an individual feels that their sense of freedom has been restrained through the use of strong coercive measures. The response creates an increase in the desire for prohibited substitutes, or a decrease in the desire to act in a preferred manner (Brehm, 1966; and Brehm and Brehm, 1981). This reaction has been linked to cases involving legal mandates (Mazis, 1975), as well as the intensely worded pitches for the pro-environmental movement (Reich and Robertson, 1979).

Attitude/Behavior Studies

Many researchers have delved into the relationships linking attitudes with practiced behaviors (Wicker, 1969; Fishbein and Ajzen, 1974; Weigel and Newman, 1976; Shuman and Johnson, 1976; Shrigley, 1990; and Sundeen, 1992). While none of the researchers determined that attitudes will be directly translated into behaviors, associations do exist. Although an in-depth knowledge of A/B studies is not necessary, the subject has been introduced to provide exposure to a consistent conclusion found within a review of A/B studies. Shuman and Johnson (1976) have reported that even though positive correlations do exist between attitudes and behavior, they are not large enough to be considered the only factors in forecasting possible behaviors.

However, because attitudes do have some influence on behaviors, researchers have conducted studies to determine the extent to which knowledge effects behavior (Borden

and Schettino, 1979; Fortner and Teates, 1980; and Soden, 1989), as well as the extent to which attitudes and knowledge working together influence behavior (Borden and Schettino, 1979). In particular, Soden (1989), after conducting a study to determine how knowledge impacted individual attitudes on marine resource protection, concluded that people more knowledgeable about marine resource protection were more likely to support marine resource protection programs. These results seem to support earlier findings (Fortner and Teates, 1980) that there is a significant positive relationship between knowledge and attitudes.

When looking at the effects of attitude and knowledge working in combination, Borden and Schettino (1979) obtained results that were less promising; while attitude and knowledge seem to act upon behavior, they do so in no consistent manner. However, because relationships do exist between attitude, behavior, and levels of knowledge, this area has been chosen for investigation in order to pursue the associations between perceived levels of stewardship and the scope of the educational campaign.

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Methodology

Stewardship Definition

Because public stewardship is such a nebulous concept, a working definition of what constitutes public stewardship needed to be developed. The following definition was based in part upon the work of Aldo Leopold (1949) entitled *The Land Ethic,* In: *A Sand County Almanac, and Sketches Here and There*, and echoes the sentiments of others who have expressed their views concerning stewardship, or have reviewed and interpreted Leopold's work (Suzuki, 1959; Naess, 1973; Schumacher, 1973; Lovelock, 1979; Callicott, 1989; Hargrove, 1989; Brady, 1990; Odin, 1991; Bloome, 1992; Block, 1994; and Cook). For the purposes of this research, "public stewardship" has been defined as follows:

> Public stewardship is the willingness of people to be liable for their actions and the resulting state of the surrounding resources. Public stewards recognize the societal obligations beyond their own short-term monetary interests, and have chosen to hold the world's resources in trust for future generations (Leopold, 207-208).
>
> For the public steward, the boundaries of their community have been expanded to include the air, water, animals, plants and soils (Leopold, 204). Value for a resource is calculated not through traditional economic means where commodities are bought and sold, but rather from the inherent value the resource possesses (Leopold, 210). Stewards understand that each element of an ecosystem is essential to the well being and natural functioning of the entire system, with the value of individual ecosystem components being derived from their contribution to the system as a whole (Leopold, 210-214).

This definition of stewardship is thorough, and represents the epitome of what proper stewardship should be. Because stewardship may exist in varying degrees, the definition became a baseline from which four areas have been selected which the researcher believes to be important in the evolution of stewardship. These criteria will

serve to illuminate the historical approach to resource use, as well as the scope of the public outreach program. The areas to be explored will be: pre-existing conditions, public education, volunteer behavior, and communal involvement.

Areas of Study

Pre-existing Conditions

A simple explanation of why pre-existing conditions may enhance stewardship practices was offered by Leopold: "No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions."

It may be that some locations are easier to build stewardship in simply because the community utilizes, or has an important link to the resource. Questions such as whether or not the resource is utilized, whether it is located in an urban setting, or whether it is used as a source of drinking water may be very important considerations in laying the foundation for the evolution of stewardship values.

Public Education

Because the literature stresses the need for informing the public, this category has been selected to determine the extent to which an organization disseminates information to the public. If the community is expected to lend its support, they first must be well informed. The extent to which an organization informs the public about the identification of problems, the preferred methods of action, and ways the average citizen may become involved, will likely play a major role in generating communal support essential to fostering stewardship.

The importance of linking a community to the resource can be inferred from Leopold (1949, p. 223-224) when he sums up his feelings for the biggest obstacle facing the evolution of stewardship:

> Your true modern is separated from the land by many middlemen, and by innumerable physical gadgets. He has no vital relation to it; to him it is the space between cities on which crops grow. Turn him loose for a day on the land, and if the spot does not happen to be a golf links or a 'scenic' area, he is bored stiff. [I]n short, land is something he has 'outgrown'.

Volunteer Behavior

In order to build stewardship, the traditional manners of thinking about, and utilizing the resource must be altered, if behavioral changes are to be successful. Volunteer monitoring organizations have an advantage in that the volunteers all have shown an interest in protecting the resource they are monitoring. By educating the volunteers about responsible behaviors they can practice at home, information will hopefully be circulated back into the community through informal personal networks, educating people by example.

Communal Involvement

The literature is firm in the belief that a cross-section of the community must be represented for successful stewardship building. Ensuring that people from all backgrounds are working together will go a long way in creating an air of cooperation through which equitable programs may be developed and implemented.

If one begins to think of a community as an individual unit, or 'owner' of the lands contained within the established boundaries, Leopold (1949, p. 214) again has put forth the need for action:

> . . . a system of conservation based solely on economic self-interest is hopelessly lopsided. It tends to ignore, and thus eventually eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning. . . [A]n ethical obligation on the part of the private owner is the only visible remedy for these situations.

Sampling Population and Procedure

In order to obtain feedback on the direction of the research, a pre-test survey instrument was informally distributed to selected volunteer monitoring organizations and environmental groups. Selecting specific groups or individuals to preview the survey instrument allowed for a rapid return rate, and utilized working relationships developed with local organizations and individuals. Each individual was asked to evaluate the definition of stewardship, as well as the direction and content of the questions, with space being provided for comments and changes.

Once all comments had been reviewed, a judgement was made as to whether the comment was a valid point which enhanced or clarified the instrument, or was merely a conflict of style or opinion. Appropriate changes concerning structure and content were made, with a mass mailing sent on 8 November, 1995. A self-addressed return envelope was provided, however postage was not prepaid since respondents had the option of mailing or faxing their replies.

Great effort was taken to ensure that the final survey instrument was no longer than one side of a printed page. The result was a 25 question survey formatted to fit on one side of an 8 1/2 x 14 sheet of paper. Appendix A (p. 77) includes the cover letter, and survey instrument that was distributed for this study.

While designing the survey, it was imperative that each question was relevant, and solicited the desired information. To aid in the process of thinking through the importance of each question, Table 1 was created. This table contains the question number, the category of stewardship-building activity it will test, the relevancy or significance of the question as it pertains to generating perceived stewardship, and what the implications of the question are. Following this systematic approach for evaluating potential questions allowed a large amount of pertinent information to be gathered from a survey that was compact, cost efficient, and easy to respond to.

A survey was mailed to each of the organizations contained within the *EPA National Directory of Volunteer Environmental Monitoring Programs, Fourth Edition*, making the total population size 516 volunteer monitoring organizations. While this guide is not an exhaustive listing of all environmental monitoring programs, each of the organizations met the same requirements of what the EPA considered a valid volunteer monitoring program at the time the guide was published. In addition, many of the organizations contained within the guide are providing credible data to a mixture of local, state, and federal agencies for local decision-making and policy generation.
Because some of the organizations listed within the guide are "parent organizations", meaning they work with many of the volunteer organizations in their state, the cover letter asked that they redistribute the survey to their satellite groups if they were uncomfortable or unable to accurately answer for the individual groups. This served to increase the potential number of responses, as well as to solicit information from the most relevant population - - individual groups currently addressing use conflicts on a daily basis.

TABLE 1

Significance of Survey Questions and Their Implications for Building Communal Stewardship

Question Number	Question Category	Significance of Question	Implication(s) of Question
1	- - -	Will immediately solicit how an organization perceives the results of their actions	Ascertains the views of the respondent without leading them to an answer based upon the line of questioning
2	- - -	- - -	- - -
3	Community Involvement	Will serve to highlight the importance, or lack thereof, of soliciting the help and support of a portion of the community directly linked to the resource.	This is one area easily impacted by a group's actions. Two potentially critical areas can be addressed through one segment of the population: community involvement, and linking a community to the resource
4	Pre-existing Conditions	Illuminates a link between the community and the resource being monitored	The more ways a resource is utilized, the greater the number of potential supporters
5	Pre-existing Conditions	Provides an economic link between the resource and the community	Where residents have a clear economic link to the resource, their concerns will be reflected in their actions
6	Pre-existing Conditions	Resource quality exhibits a direct link to the health of the community	The advantages of increased awareness and concern dealing with resource protection will be more likely if individuals link water quality to their daily lives
7	Pre-existing Conditions	Links community to the resource	Provides a heightened sense of communal awareness/purpose
8	Public Education	Identifies the level of information being provided to the public	Circulation of information helps to educate the public to increase awareness and education
9	Public Education	Shows an organizational commitment to expand its role into multiple areas of resource protection	Helps to assure that an organization's findings and concerns will be heard by the decision-making parties
10	Communal Involvement	Is public outreach a part of an organization's agenda	Builds communal support and links the community to the resource
11	Public Education	Will serve to highlight any unique problems that may have been encountered in building stewardship	Some areas may be more difficult to build stewardship in due to the communal structure

Question Number	Question Category	Significance of Question	Implication(s) of Question
12	Public Education	Determines how an organization is attempting to educate the community	Some organizations may have no desire to build stewardship. Activities will therefore be focused into other areas
13	Volunteer Behavior	Is an organization making an effort to educate volunteers about the "big picture"	An already interested audience may adopt additional "environmentally responsible" behaviors; Information may circulate through societal networks
14	Pre-existing conditions	Links the public to the resource	A community having access to a resource may utilize it more, and thus develop a sense of care and concern
15	Volunteer Behavior	Brings and organization's goals down to an individual level where they are dealt with on a daily basis	A receptive and knowledgeable audience may alter damaging behaviors more readily; Could circulate information by example and through societal networks
16	Public Education	mitigation of problems	Organizations working behind the scenes may be able to educate and inform residents, and find equitable solutions
17	Communal Involvement	Tests to see if an organization's membership represents a cross-section of the community	A cross-section of the community could provide better communication between affected parties, allowing the free exchange of ideas, and the development of equitable solutions to problems if the need arises
18	Communal Involvement	Links community to the resource	Business advertising will draw in customers, possibly illuminating the "new" potentials the resource holds; People who utilize a resource will tend to be more attached to it, thus treating it better
19	Public Education	Illuminates the degree to which an organization is attempting to reach as many individuals in the community as possible	Media exposure increases the community's level of knowledge concerning relevant issues, recognizes participating individuals, and could spur involvement
20	Volunteer Behavior	Serves to educate the community about resource related issues, and shows that individuals can make a difference	A better informed public is able to weigh the available facts, and intelligently discuss their concerns with decision-makers

Question Number	Question Category	Significance of Question	Implication(s) of Question
21	Volunteer Behavior	How often does an organization meet directly with its volunteers?	Organized meetings provide a forum where information and ideas can be exchanged, and allows the volunteers to hear directly the findings, progress, and new directions being pursued
22	- - -	Aims to find out the number of organizations this study applies to	Some organizations may have no desire to build communal stewardship; They simply want to provide credible data for analysis and decision-making
23		Are organizations expanding their potentially narrow views of resource protection to address larger problems	Monitoring groups will eventually come to the understanding that environmentally responsible behaviors need to be encouraged on a system wide basis; A watershed is only as clean as the individual components
24	Public Education	Will illuminate the most/least common activities being pursued	Does any one activity affect the building of stewardship more than the others?
25	- - -	This question allows each respondent an opportunity to add their feelings about the researcher's definition of stewardship and the line of questioning	Organizations not agreeing with the definition will be eliminated from the primary statistical calculations

A record was kept of all returned questionnaires, and after approximately four weeks a reminder letter was sent on 15 December, 1995 (Appendix B, p. 81) to each non-respondent urging their cooperation, along with another copy of the survey and a return envelope.

As the questionnaires were returned, the responses were numerically coded and entered into the spreadsheet package Excel®. An example of numerical coding would be to code 'yes' answers as one's (1), and 'no' answers as two's (2). While this type of coding scheme may be adopted for many reasons, the primary purpose is to allow the use of mathematical operations during data analysis.

The cut-off date for receiving questionnaires was 9 February, 1996, when the response rate had slowed considerably (Figure 1). In total, 254 surveys were returned prior to the cut-off, a response rate of 49%. Seven returns were received after 9 February and were not included in any of the subsequent analyses.

Response Validity

As was previously mentioned, the validity of the questionnaire responses was a concern during the study design process. These concerns necessitated a review of the literature to determine if self-report data could yield meaningful conclusions, or whether the respondents intentional or unintentional distortion of the data would severely compromise the results.

Using some form of survey instrument to collect information about variables of interest is not a new idea, nor is relying on the subject to report their own behavior. Brown and Gilmartin (1969) studied the prevalence of this type of data collection process in

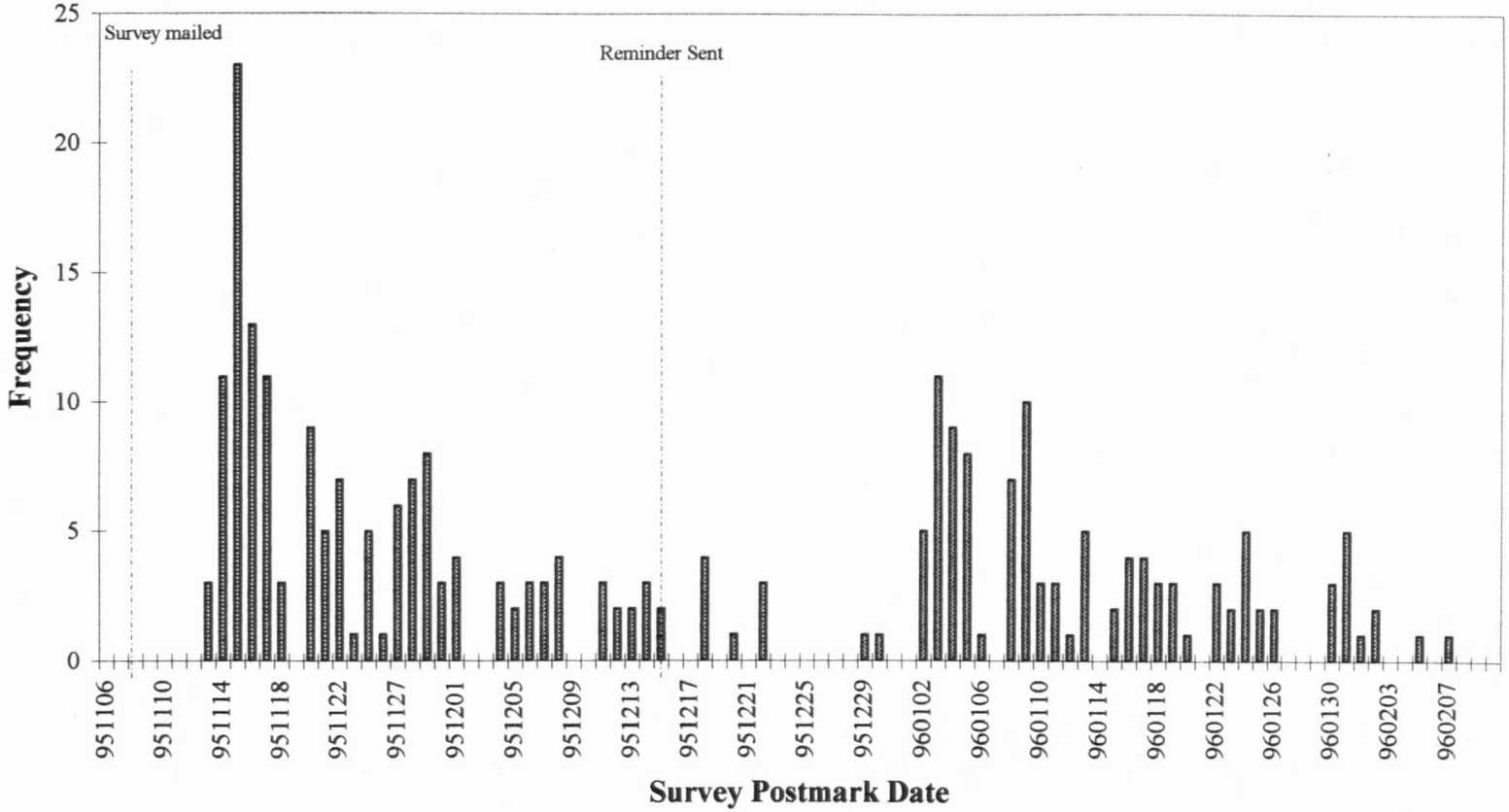


FIGURE 1: **Survey Response With Respect to Primary and Secondary Mailing Dates**

sociological research, and determined that 90% of all articles published in *American Journal of Sociology* and *American Sociological Review* between 1965-66 utilized questionnaires or interviews as the primary data collection device. In most instances, these methods gather information about tangible independent variables (age, sex, marital status), and relate these responses to dependent variables which are usually more abstract and difficult to measure (Phillips and Clancy, 1972).

Phillips and Clancy (1970) investigated the biases of self-report, supporting their hypothesis that respondent errors in reporting information are related to the social desirability of the trait or action. In basic terms, this is the likelihood that individuals will admit to socially acceptable traits while denying those deemed undesirable. This concept is not new to psychologists and sociologists, being discussed either implicitly or explicitly in numerous studies (Edwards, 1953, 1957, 1959; Rosen, 1956; Cowen and Tongas, 1959; Wiggins and Rumrill, 1959; Cook and Selltiz, 1964; and Dohrenwend, 1966). According to Cook and Selltiz (1964):

> [T]he purpose of the instrument is obvious to the respondent; the implications of his answers are apparent to him; he can consciously control his responses. Thus a person who wishes to give a certain picture of himself---whether in order to impress the tester favorably, to preserve his own self-image, or for some other reason---can rather easily do so.

Phillips and Clancy (1972) point out however that sociologists, while not totally ignoring the effects of social desirability, have paid it less attention than some other disciplines, simply trying to control it using a variety of actions, such as stressing a respondent's anonymity. In doing so, it is hoped that these actions will make it easier for individuals to give honest answers regardless of social desirability.

For the purposes of this study, two philosophies were adopted which hinge on the fact that researchers, despite their best efforts, have largely been unable to totally eliminate the effects of this type of bias. The first is from Campbell (1974), who notes that research is composed of a series of necessary assumptions, in which a researcher places their trust for the purpose of testing other relationships. Second, is the line of reasoning adapted by Phillips and Clancy (1970). According to them, many sociologists would argue the distortions of an explanatory survey which seeks the relative occurrence of social phenomena are unimportant. This is because distortions may not matter much if everyone in the population being compared distorts their answers in a similar fashion. The remarks of Hyman (1964) best sum this line of reasoning:

> All scientific inquiry is subject to error, and it is far better to be aware of this, to study the sources in an attempt to reduce it, and to estimate the magnitude of such errors in our findings, than to be ignorant of the errors concealed in the data. One must not equate ignorance of error with the lack of error.

-4-

Analysis

Statistical Foundation

During the survey design process, a key matter was how the data was ultimately going to be analyzed. However, it was not until the first responses were catalogued in Excel®, that serious questions arose as to which statistical tests would be most appropriate for the type of data being collected. The concern, was how to effectively relate the responses from the nominal or ratio variables to the perceived stewardship response, an imperfectly scaled interval variable; imperfect in that the divisions on the scale were not necessarily equal. Essentially there were two choices; follow a traditional conservative approach, apply nonparametric statistics, and reduce the level of detail contained in the results, or forge ahead and utilize parametric statistics, but run the risk of obtaining suspect conclusions. Seeking solutions to this dilemma, a brief review was conducted of the social measurement literature.

In 1946, Stevens first introduced the idea of measurement scales to psychological research. This scale had four distinct categories: nominal variables, which may be grouped by name; ordinal variables, which can be scaled using greater than (>) and less than (<) terminology; interval variables, where the scalar values are equidistance apart, and zero (0) is an arbitrary value; and ratio variables, where like interval data the distance between scalar values is equal, however, zero (0) is an absolute value.

In addition to defining individual levels of measurement, Stevens specified which statistical analyses were appropriate for each category; nonparametric tests were appropriate for nominal and ordinal levels, while interval and ratio data justified parametric analysis. According to Gaito (1980), restricting statistical analyses based on the category of measurement has resulted in misunderstandings which have overemphasized the use of nonparametric statistics.

Critics soon surfaced (Burke, 1953; Lord, 1953; Gaito, 1960; Kaiser, 1960; Anderson, 1961; Bonneau, 1961, Gaito, 1980; and Bohrnstedt and Borgatta, 1981) discounting the Stevens assertion that appropriate statistical procedures are dictated by the level of measurement. In particular, Burke (1953), Gaito (1960), Anderson (1961), and Boneau, (1961) contend that confusion between statistical theory and measurement theory has led to the supposed relationship of statistical procedures and measurement categories.

The essence of their argument is that measurement theory revolves around a concern for meaningful numbers. While developing a measuring instrument, researchers are concerned with its reliability and validity. Determining the validity of data is to focus on the underlying meaning of the numbers and question their authenticity. Statistical theory, on the other hand, only concerns itself with the relatedness and differences of numbers. The meaning of numbers simply does not enter into the question. Gaito (1980) believes this to be especially true in tests of the null hypothesis, and quotes Lord (1953) as saying: "the numbers do not know where they came from."

In 1953, Burke voiced his early criticism after comparing measurement scales and statistical operations; the conclusions of his study being that "the properties of a set

of numbers as a measurement scale should have no effect upon the choice of statistical techniques for representing and interpreting the numbers."

According to the work of Stevens (1946), the analysis of variance (ANOVA) procedure is appropriate only if data is measured at the interval or ratio level. However, it was shown that the elements which define interval data are unimportant when using ANOVA as long as the mathematical assumptions are satisfied (Eisenhart, 1947; Savage, 1957; and Gaito, 1960). The assumptions necessary for the ANOVA procedure are simply normality, independence, and homogeneity of variance. Assuming interval level data is nowhere to be found (Gaito, 1980).

Based on the continued acceptance of these assertions, parametric statistics were used in this study during the analysis process, provided the underlying mathematical assumptions were satisfied by the data.

Analytical Procedure

During the data analysis process, three separate procedures were performed on the responses to each question. First, the frequency of responses for each question was determined using Excel®. This was a straightforward operation for the yes/no and multiple choice questions, however the 'check all that apply' questions were handled a bit differently. For these questions, (numbers 4, 8, 11, and 17), frequencies were calculated for the number of available choices that were checked. No distinctions were made for individual choices; if four out of five choices were marked, a frequency of four was entered, regardless of which four choices were marked. Graphs were then created for each frequency analysis.

Next, responses for each question were related to an organization's perceived stewardship value. This was accomplished by aggregating the stewardship values for each question choice, and taking the mean. For example, with a yes/no question, the mean of perceived stewardship values was calculated for all groups answering 'yes', and then for all groups answering 'no'. Graphs were then created of perceived stewardship as a function of question response. It is important to note that during this stage of data analysis, as well as during the significance testing discussed next, respondents had to answer both questions to be included in the analysis. This was done to ensure a 1:1 relationship, and prevent unnecessary weighing of the mean values. While this procedure did prevent the entire sample size of 254 organizations from being analyzed for each relationship, N for each question remained sufficiently large, so that no detrimental effects were incurred.

Finally, the significance was calculated for the differences between the perceived stewardship means. Question design again necessitated that two separate forms of significance testing be incorporated into the analysis procedure. The software package Excel® was used to calculate the Z(obtained) test for significance, which was used to determine if the differences within dichotomous questions occurred simply by chance. To accomplish this, results are transferred to their respective locations under the normal curve (Figure 2). Using a confidence level of 95%, the associated z-scores are 1.96 for a two-tailed test, and 1.64 for a one-tailed test. If Z(obtained) exceeds either of these values, it can be assumed with 95% certainty that the differences did not occur simply by chance, and are statistically significant.

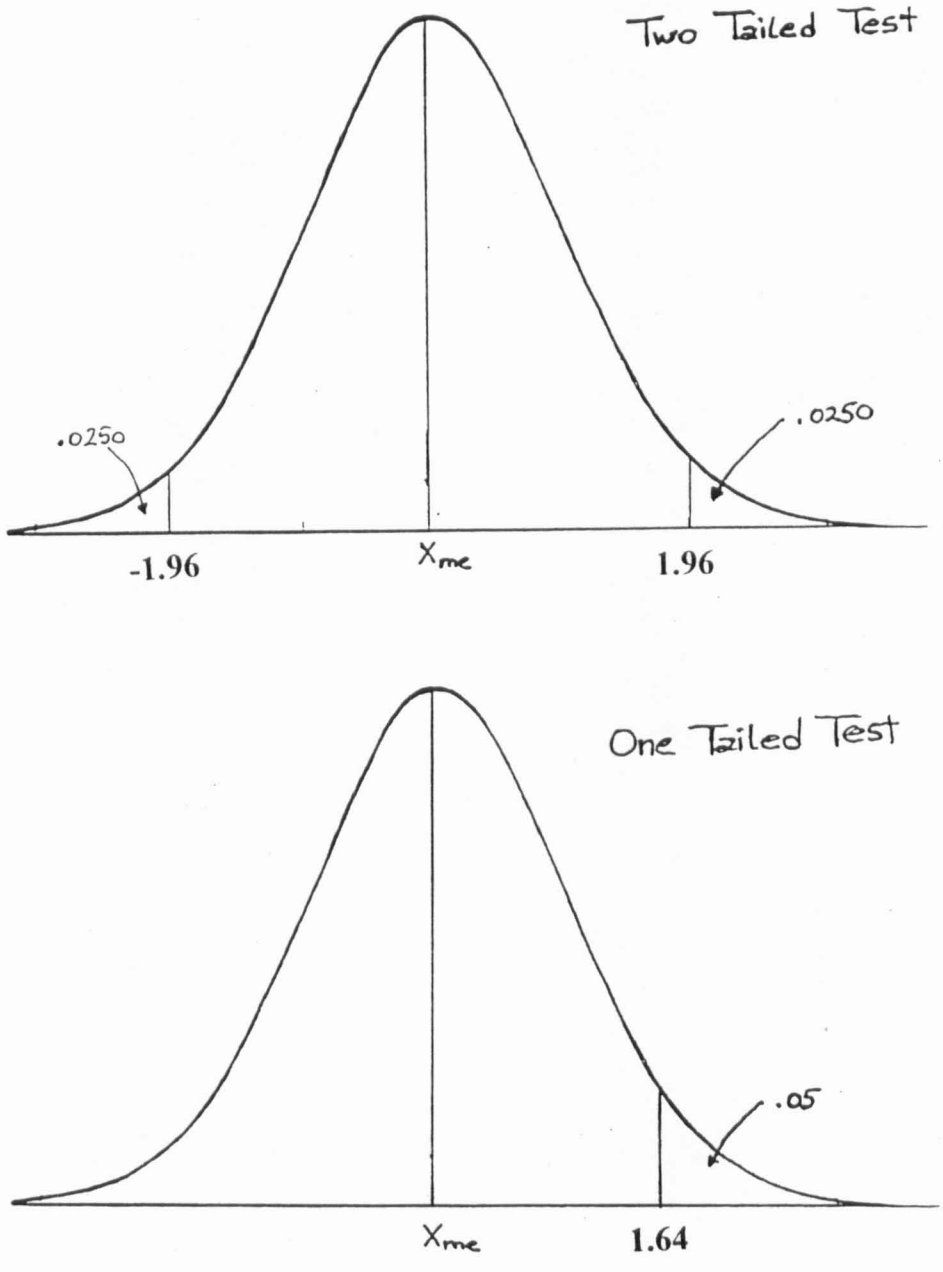


FIGURE 2: The Normal Curve and the Z-Scores Associated With a 95% Confidence Interval (Source: West, N. 1995. *Applied Quantitative Methods in Marine Affairs*. p. 59)

According to Healy (1993), the Z(obtained) test for significance is appropriate in a two-sample situations with a large sample size. Using this test, the null hypothesis was simply $\mu 1=\mu 2$, or, there were no statistically significant differences in the mean of perceived stewardship values. The only assumption for this test was independent random sampling, which was satisfied by the surveying procedure. Using Z(obtained), it was not necessary to have equal sample sizes. As long as the combined sample size exceeds 100, differences will be normally distributed, and area under the standard normal curve may be used to establish critical regions.

In the case of multiple choice questions, the researcher is seeking significant differences between all pairs of possible responses. For this study, the statistical software package SAS® was used to calculate a one-way ANOVA to determine if the differences in sampling means was significant. In this case, differences were sought between the response to a question (independent variable), such as the number of ways the resource is utilized, and the associated perceived stewardship value (dependent variable). To accomplish this, data were aggregated based on the response choice, and the mean of perceived stewardship was calculated for all organizations responding in a similar manner. Using a one-way ANOVA, the null hypothesis is $\mu 1=\mu 2=\mu 3=...\mu n$. Three assumptions were made for this test: independent random samples, normally distributed populations, and equal population variances. These assumptions are reasonable for this work due to the large sample size, and the use of a survey to collect the data.

Because ANOVA only indicates whether a significant difference exists, and does not isolate which pair(s) are significantly different, Scheffe's Multiple Comparison Test was used when significant differences were indicated to isolate the pair(s) of responses that

were significant. Again, it was not necessary to have equal sample sizes, in that ANOVA and Scheffe's test can handle some deviation in this respect (Ysuf et al, 1987; Healey, 1993; and Sirkin, 1995). A final reason for choosing Scheffe's test was that it is considered to be very conservative (Winer, 1962). While this may result in a greater Type II error, meaning the research hypothesis is falsely rejected, because of the error involved in self-report information, and because the researcher believes this study to be a first examination of using volunteer monitoring organizations to build stewardship, erring on the side of conservatism was deemed acceptable.

To get an idea of what effect the conservative approach was having on the results, Tukey's HSD multiple comparison procedure was run concurrently with Scheffe's test. While both tests adequately control type I errors (falsely accepting the research hypothesis), the Tukey HSD procedure generally produces fewer type II errors than Scheffe's test (Winer, 1962). The reason Tukey's HSD was not used exclusively in this study is that it is not generally applied when the categories being compared have differing sample sizes, and it is unknown if this would result in any erroneous conclusions. During the analysis process, any large discrepancies between the two tests were noted, and will be reported in the results section.

One final note on this subject; if Scheffe's or Tukey's HSD multiple comparison test is being invoked, the ANOVA procedure has already indicated that significant differences exist within the data. Multiple comparison tests are simply used to further isolate where these differences likely exist. If a multiple comparison test fails to reveal any, or a small number of differences, it does not mean that differences are not present,

rather any existing differences were not large enough to draw solid conclusions at the specified confidence interval.

Results of Frequency Analysis

While frequency results do not generally provide a great deal of information by themselves, the responses on some of the more general questions deserve to be discussed here. In order to provide a general breakdown of the organizations responding to this study, organization profiles have been included in Appendix C (p.83). The organization profiles show that the majority of monitoring groups were relatively small, with 69% having fewer than 100 volunteers. Although there was an enormous range in the annual budgets for these organizations, when reduced to a more comparative figure of budget dollars per volunteer, 56% of the monitoring groups had an annual budget of less than 200 dollars per volunteer per year.

After obtaining a general understanding as to the size of the volunteer organizations, the next step was to explore how organizations perceived their efforts at building stewardship in the community. Figure 3 shows the frequency of perceived stewardship responses, with the frequency of responses along the y-axis, and the perceived stewardship value along the x-axis. On this figure, a score of zero (0) would mean that a volunteer group perceived that they have been totally ineffective at building stewardship within their community, as determined by the working definition of stewardship outlined in Chapter 3. On the other hand, a score of six (6) would indicate that an organization perceived that they have instilled a sense of stewardship in their community that completely coincides with this study's working definition of stewardship.

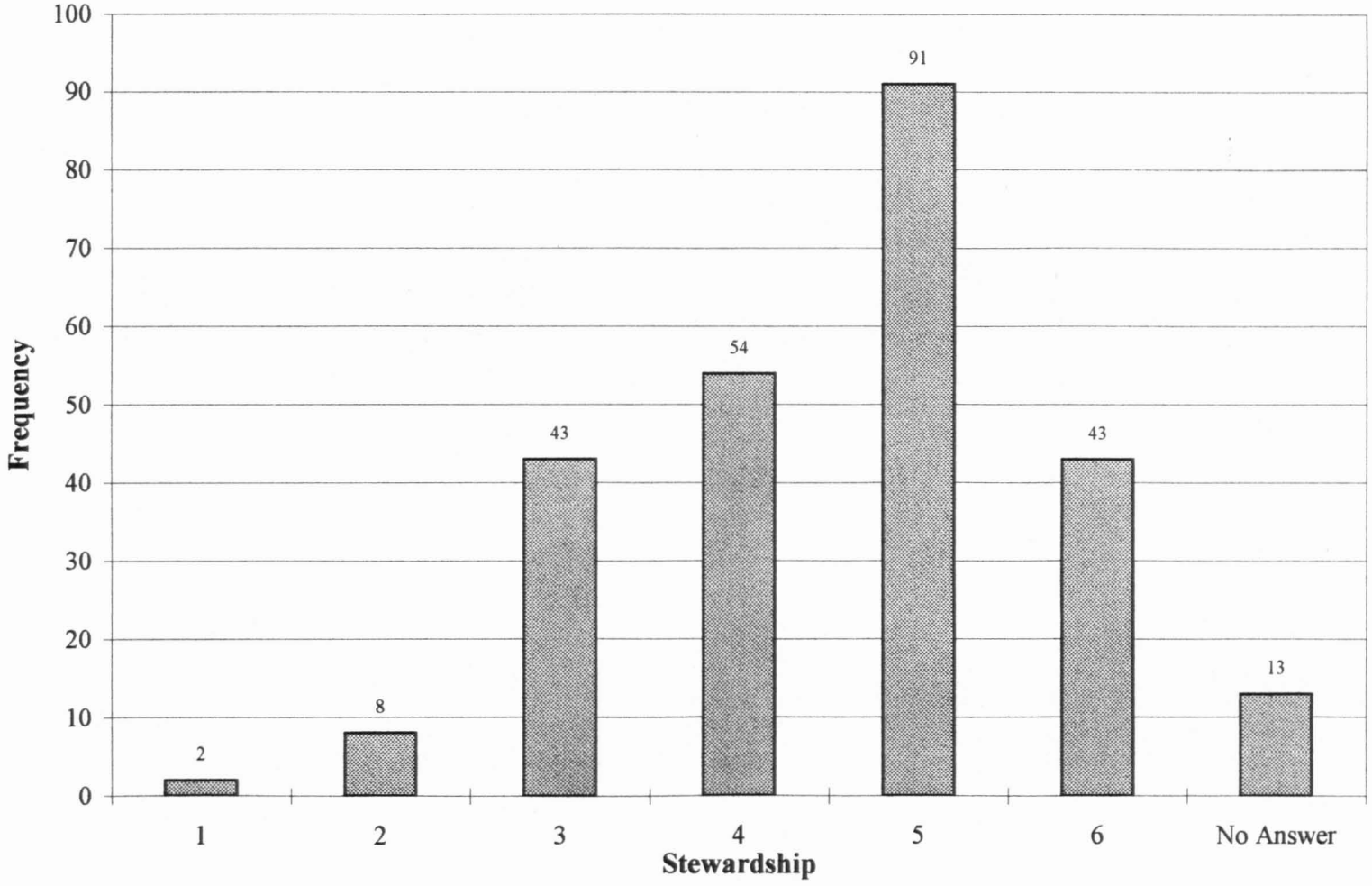


FIGURE 3: Frequency Distribution for Perceived Stewardship Levels

The curve in Figure 3 is of normal shape, but is somewhat skewed towards positive responses. This did not cause problems during the data analysis, because as was previously mentioned, sample sizes exceeding 100 can be assumed normal. This type of distribution was expected, and has three possible explanations. First, if the self-report literature (Cook and Selltiz, 1964; Phillips and Clancy, 1970) is correct in the respect that individuals will inflate positive traits or actions, then one would expect to receive a small number of low perceived stewardship values. Second, higher perceived stewardship values may be related to the caliber of the organizations responding. In other words, organizations that perceive their actions to have had little impact at building stewardship within the community, simply chose not to respond to the survey. Finally, the population for this study was chosen to be the *National Directory of Environmental Monitoring Programs*. This directory is focused towards larger, highly organized groups, which would tend to be interested in stewardship issues.

The next frequency distribution worth mentioning is the response to question number 22: Is fostering environmental stewardship a goal of your program? Of the 254 respondents, 251 responded that building stewardship was indeed a program goal, one organization stated that fostering stewardship was not a program goal, and two groups chose not to respond to this particular question. These results were beneficial during the analysis process because all 254 responses could be included in the testing. Had a large number of organizations replied negatively to this question, these groups would have had to have been removed from the analysis to ensure that perceived stewardship means were not corrupted by organizations possessing goals beyond the scope of this study.

Another important finding was the response to question number 25: Do you agree with our definition of public stewardship? For this question, 221 organizations out of 254 responded positively, 12 groups did not agree with the definition, and 18 organizations did not respond. While no explanation can be made for why particular groups did not respond, definitive reasons exist for many of the groups that responded negatively. On the survey instrument, an explanation was requested of any group that did not agree with the definition of stewardship that was offered. In all of the cases where respondents offered an explanation, none of the reasons indicated a discrepancy with the content of the definition, rather organizations did not agree with the length and theoretical nature of the stewardship definition. In essence, the definition was too "academic" and was too cumbersome to be practical. Although it is true that the definition is wordy, no existing comprehensive definition could be located which tied together all of the points mentioned.

Because stewardship means many different things to many different people, it was important to generate a thorough definition for this study. In order to generate meaningful results it was imperative that all groups compared themselves to the same standard. Unlike the previous question where a negative answer justified removing a group from the analysis process, agreement with the definition is not as critical. As long as all groups are comparing themselves to the same standard, it makes no difference whether or not they agree with those standards. What is most encouraging is that length of the definition, not content, was in dispute.

Finally, the frequency distribution was observed for question 2: Rate the quality of data collected by your organization. Of the organizations that responded, 29%

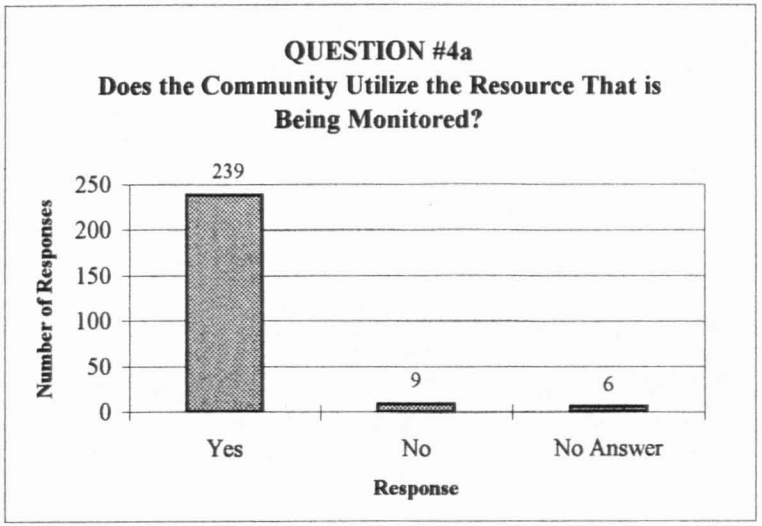
indicated that QA/QC was only of marginal importance, due to the fact that the data were being used primarily for educational purposes. One benefit of focusing more towards education is that organizations are freed from the time and monetary constraints needed to collect highly accurate data, and are able to divert more of their limited resources into public involvement activities.

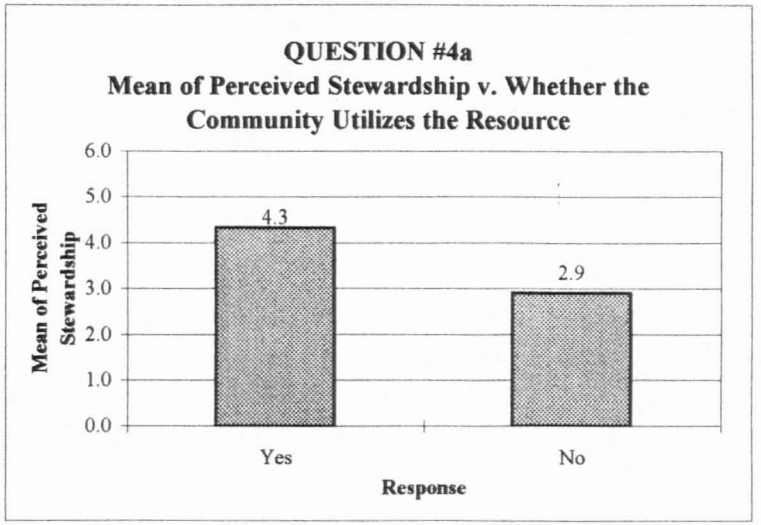
Relationship of Perceived Stewardship to Survey Responses

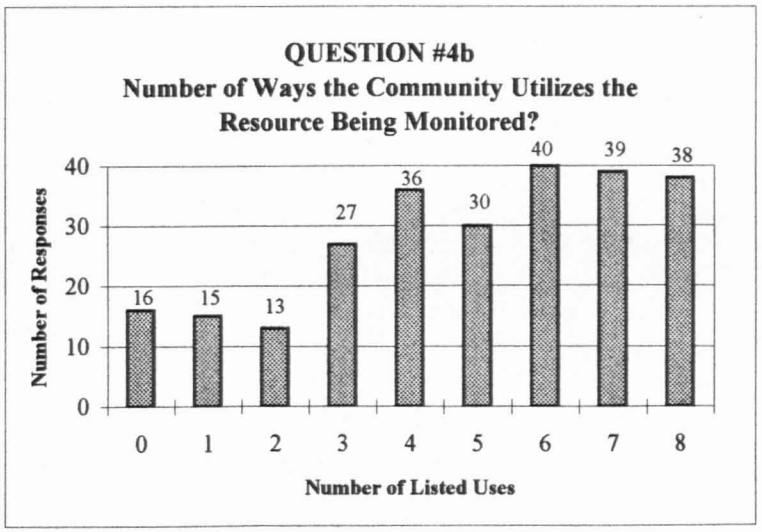
Pre-existing Conditions

The category of pre-existing conditions was selected to see if conditions or events beyond a volunteer monitoring group's control, have a notable impact on the perceived stewardship level in a community. Five specific areas were selected within this category which potentially had the greatest implications for the largest number of monitoring communities: whether the community utilizes the resource (questions 4a,b); whether property values are linked to the condition of the resource (q. 5); whether the resource is used as the community's source of drinking water (q. 6a,b); whether there has ever been a previous threat to the resource (q. 7); and whether the public has access to the resource (q.14).

Figure 4a shows the response to questions 4a,b: Does the community utilize the resource, and if so, in what ways? In addition, the mean perceived stewardship values for each response are displayed. Overwhelmingly, respondents indicated that the resources are being used by the community. Results of the survey do indicate that, areas where the monitored resource is actively being used by the community have significantly higher perceived stewardship levels (Table 2). These results were expected, as the







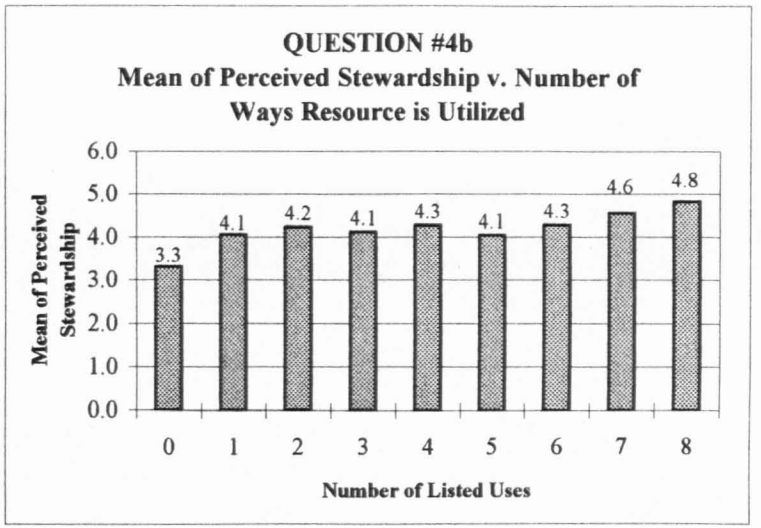


Figure 4a: Response Frequency and Mean Perceived Stewardship Values for Questions # 4a,b

TABLE 2

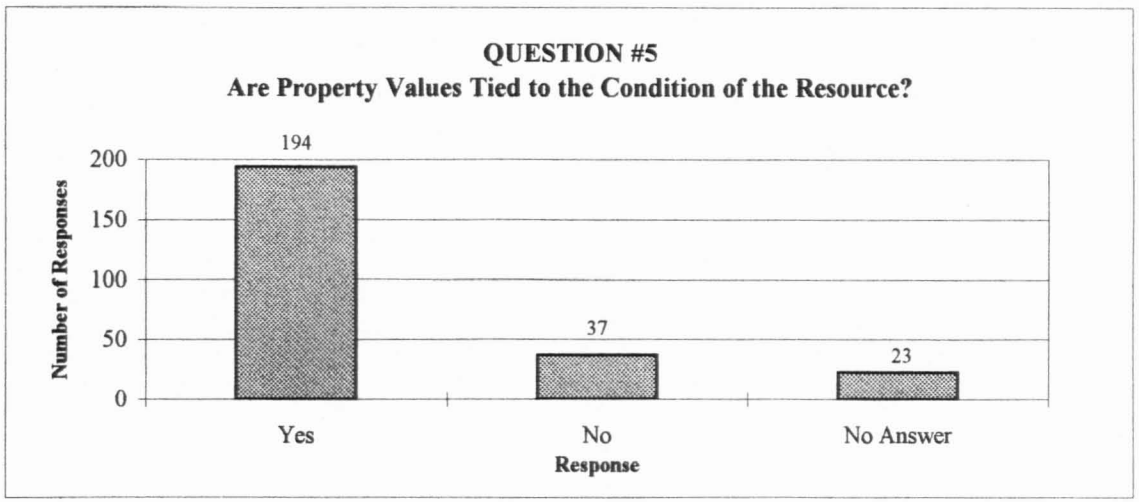
Significance Tests for the Category: Pre-existing Conditions

Question #	N	Confidence Interval	Significance Test	Z Critical one-tailed	Z Critical two-tailed	Z Obtained	F Score	p
#4a. Does the community utilize the resource being monitored?	237	0.95	Z obtained	1.64	1.96	3.02	---	---
#4b. In which of the following ways does the community utilize the resource and surrounding area?	241	0.95	One-Way ANOVA	---	---	---	3.34	0.001
#5. Do local property values depend in part upon the condition of the resource?	219	0.95	Z obtained	1.64	1.96	1.99	---	---
#6a. Is the resource used as a source of drinking water?	233	0.95	Z obtained	1.64	1.96	2.03	---	---
#6b. If the resource is used as a source of drinking water, approximately what percentage of the community knows where their water comes from?	53	0.95	One-Way ANOVA	---	---	---	0.78	0.54
#7. Has there ever been a large threat to the resource?	228	0.95	Z obtained	1.64	1.96	1.64	---	---
#14. How many public access points are located on the resource being monitored?	209	0.95	One-Way ANOVA	---	---	---	2.19	0.05

community possesses a direct link to the resource. It could be that *because* the resource is being utilized that is why the monitoring exists, but regardless of why a monitoring program was undertaken, a definite link exists between the community and the resource. In addition to this, organizations responding that the resource was not used had significantly lower perceived stewardship levels than communities where the resource was actively being utilized in all eight (8) of the manners listed on the survey instrument.

In this study, 76% of the respondents stated that property values were indeed tied to the condition of the resource (Figure 4b). The mean perceived stewardship level in these areas was 4.4, and was significantly greater than areas where property values and resource condition were not linked (Figure 4b) (Table 2). While it is true that a monitoring organization has no control over this aspect, and that increased concern may be plainly self-serving in nature, economic associations are very real and provide another means to link the community and the resource.

One of the areas that provided interesting results was that the majority of resources being monitored are not used as a source of local drinking water (Figure 4c). But, for the 28% of communities that do depend on the resource for their water supply, the degree of perceived stewardship was significantly higher than in other areas (Table 2). It did not make a difference in these communities, however, whether a greater percentage of the population was aware of the source of local water supplies. The mean perceived stewardship levels for increased community awareness are shown in Figure 4c, with the lack of statistical significance displayed in Table 2. These results were revealing in that the large majority of responding organizations were probably not implemented due to immediate health concerns, and that widespread public education did not appear to have an



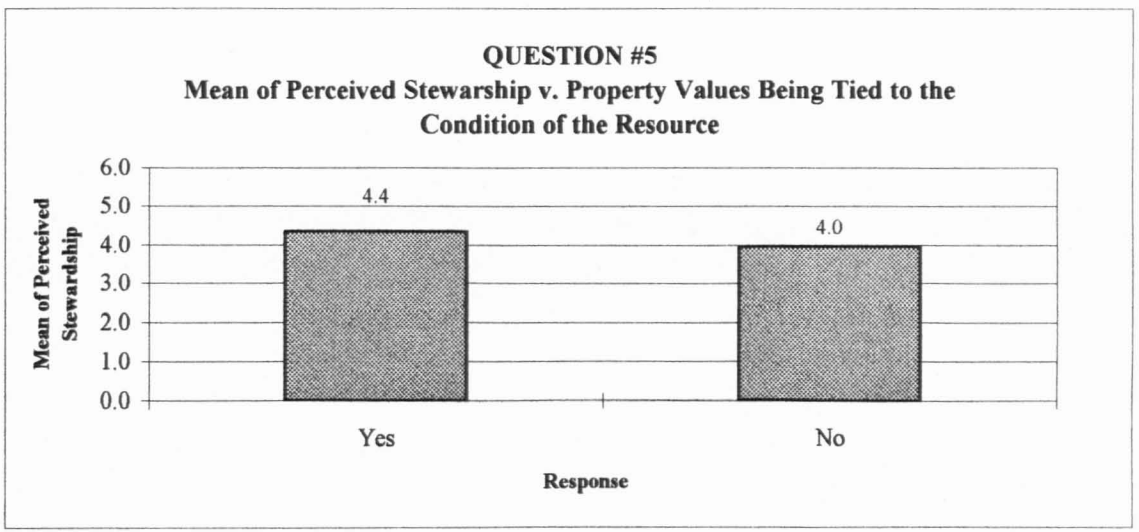
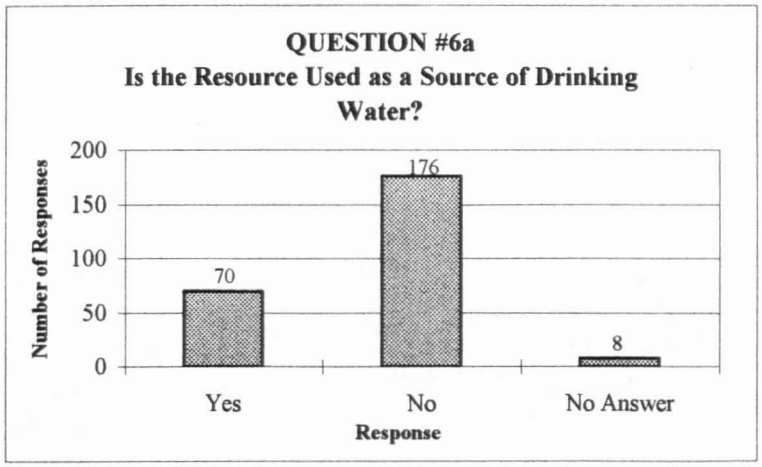
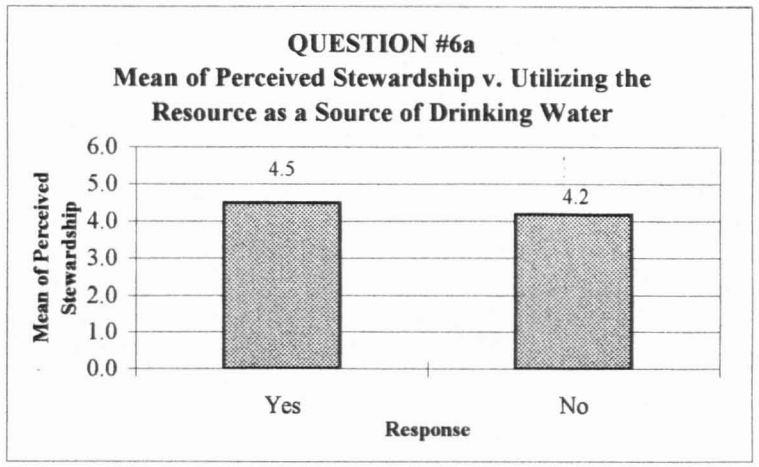
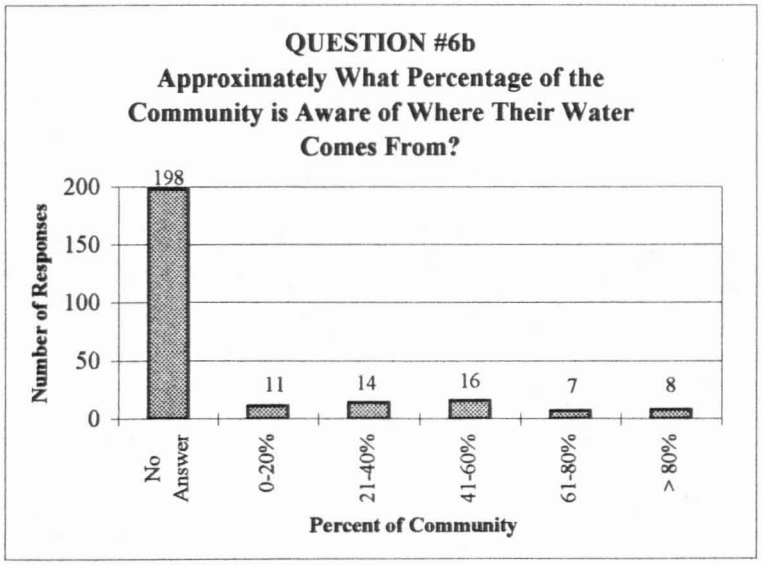


Figure 4b: Response Frequency and Mean Perceived Stewardship Values for Question # 5







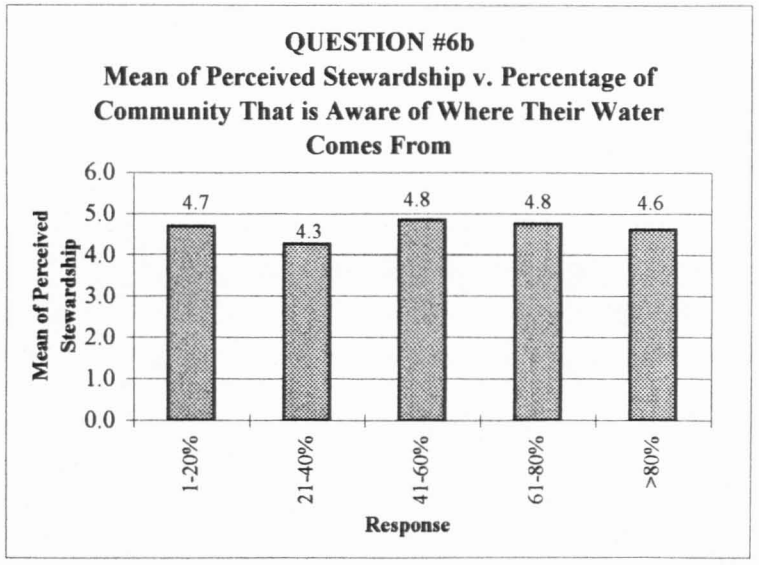


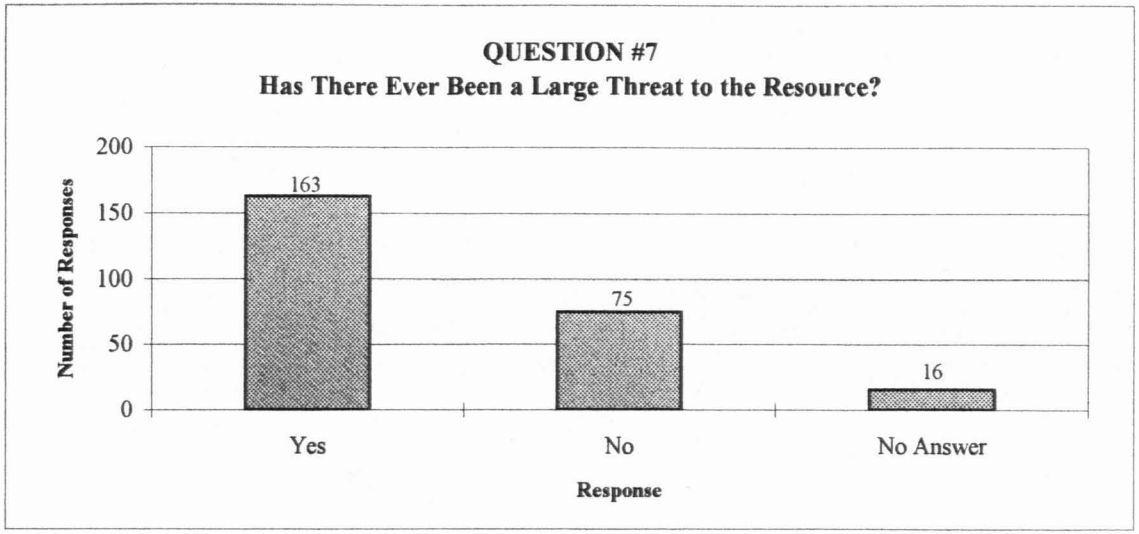
Figure 4c: Response Frequency and Mean Perceived Stewardship Values for Questions # 6a,b

appreciable outcome in this instance. The implications for this are that monitoring groups need to focus on more than just educating the community about the source of local drinking waters; individuals must also be educated on the impacts of daily activities on local water supplies.

Another unexpected outcome of the study was that even though more than 60% of the responding groups answered that there had been at least one previous large threat to the resource (Figure 4d), the perceived stewardship levels for these groups was marginally greater than in communities where no previous threat existed (Table 2). It had been expected (assumed) that communities faced with past uncertainty over the quality of a local resource would possess a greater dedication to the preservation and monitoring of local resources. One possible explanation for this apparent discrepancy is how the survey question was phrased, in particular, the use of the term 'large threat'. It is plausible that this term is much too general, and that what a program coordinator held as a formidable threat did not directly translate into an angry and concerned public.

Along this same line, no descriptive information was requested from respondents to indicate how many years had passed since the last threat to the resource, or the extent of any damages. It is very plausible that in order for a threat to have a strong impact on a community, it must have occurred fairly recently, it must have had a serious impact on the resource, or both.

Although the statistical significance was not as large as expected, differences did exist, and represent an additional manner in which a community may be drawn together and effectively linked to a resource.



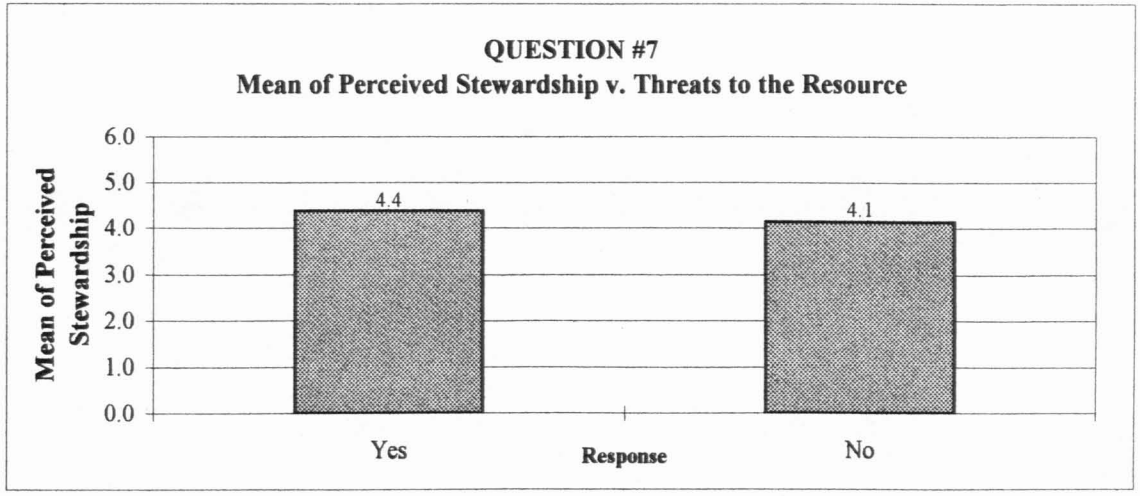
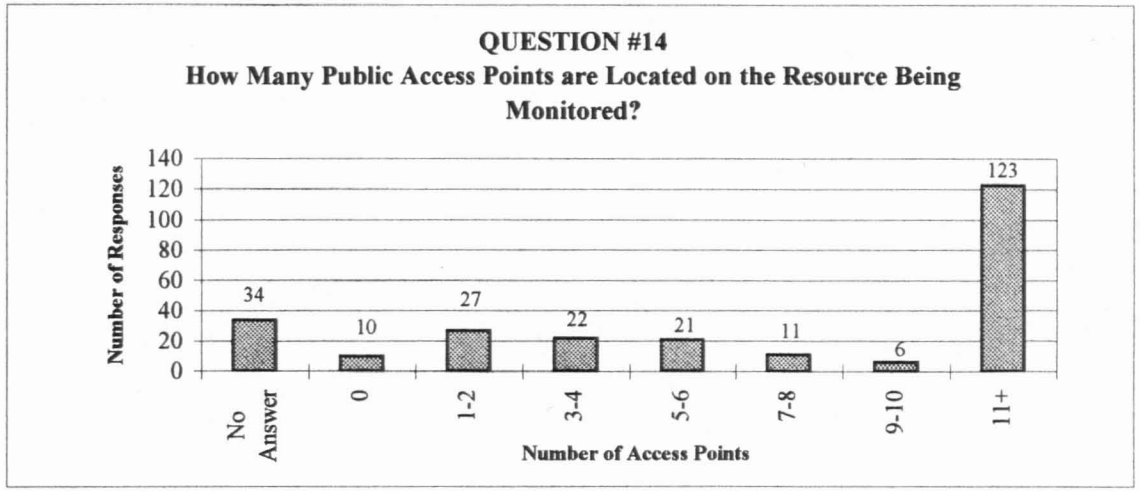


Figure 4d: Response Frequency and Mean Perceived Stewardship Values for Question # 7

The final area tested in the pre-existing conditions category was the possible connection between public access and perceived stewardship (Figure 4e). In this case, it was theorized that the more access a community had to the resource being monitored, the stronger the link, and thus, the higher the perceived stewardship levels. While the one-way ANOVA test did return a statistically significant difference amongst the responses which ranged from zero access points, to eleven or more, the significance was too small for the multiple comparison test to identify where exactly the differences existed. This was another area of concern in that it was believed that less access would directly translate into lower degree of perceived stewardship within the community. Access however, does not necessarily dictate usage, and determining the percentage of the community utilizing the resource may have delineated stronger differences. Another point worth considering is that while access was viewed as a positive trait for this study, not all monitoring groups may hold this view. Many times, exclusiveness is also considered a positive trait, and organizations may be willing to trade one for the other.

Public Education

Four areas were chosen for review under the public education category: How are the organization's goals, findings, and progress distributed throughout the community? (q. 8); How many meetings over the past year has a group member attended to advocate for the resource being monitored? (q. 9); Does the group provide remediation information when problems are located? (q.16); and What is the organization's primary goal? (q. 12). The category of public education was selected due to the strong assertions in the literature that educating and informing the public can build trust between an organization and the community, and can pave the way for successful program initiatives.



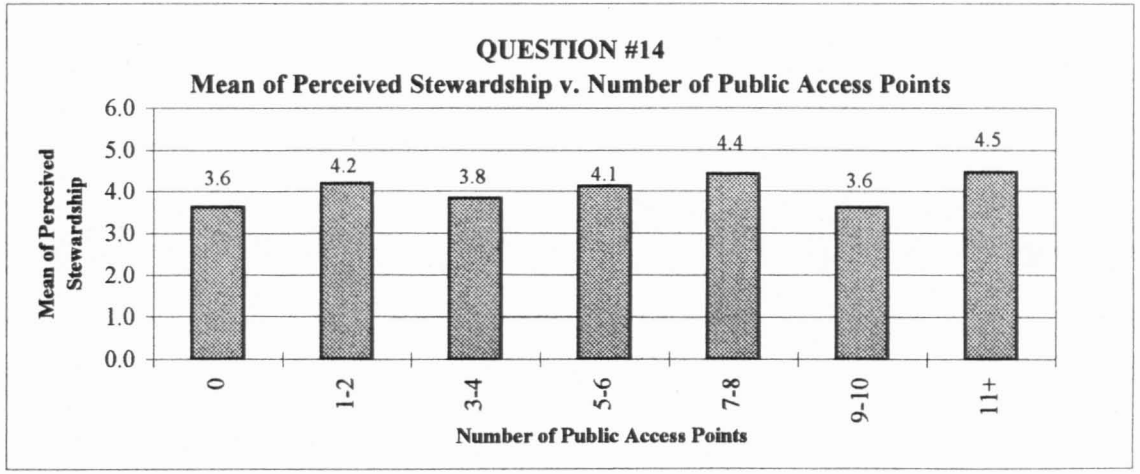
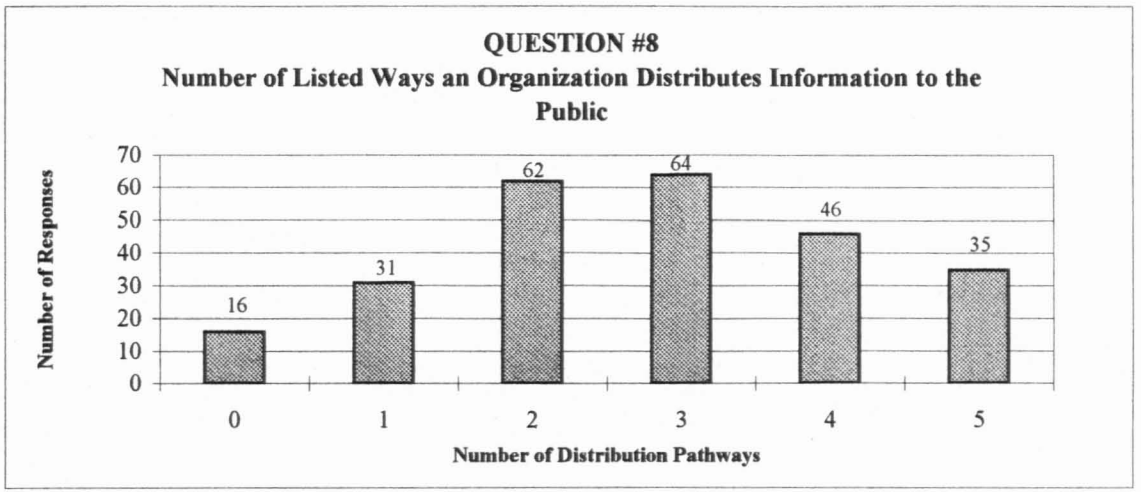


Figure 4e: Response Frequency and Mean Perceived Stewardship Values for Question # 14

On the survey instrument, respondents were asked to indicate which of the five methods were used to distribute information to the local community: newsletters, public meetings, educational displays, festivals, and outings promoting the resource. No distinctions were made as to the specific means a group chose, rather differences in perceived stewardship were examined based on the number of different methods used. Although 50% of the responding groups indicated that information was circulated in two to three of the listed manners (Figure 5a), significant differences in perceived stewardship were located between groups utilizing four or five different means, and those using only one (Table 3).

Information distribution represents another weapon in the arsenal of volunteer organizations, designed to build local awareness and concern for their cause. If an organization expects support from the community, that community must first understand the nature of any existing or potential problems. Generating higher perceived stewardship levels by increasing the number of information pathways, does not however, require a larger financial outlay by monitoring groups. Except for possibly the newsletter option, time and organizational skills represent the only major areas of commitment.

Figure 5b shows the response frequencies for the number of public meetings that a volunteer group member attended to advocate for the resource, along with the associated perceived stewardship means for each response. Though the one-way ANOVA did indicate that significant differences exist between the means of perceived stewardship (Table 3), Scheffe's multiple comparison test was not able to isolate where those differences were located. Tukey's HSD test however, did place the significant difference between groups that did not attend any meetings, and those attending nine to ten meetings



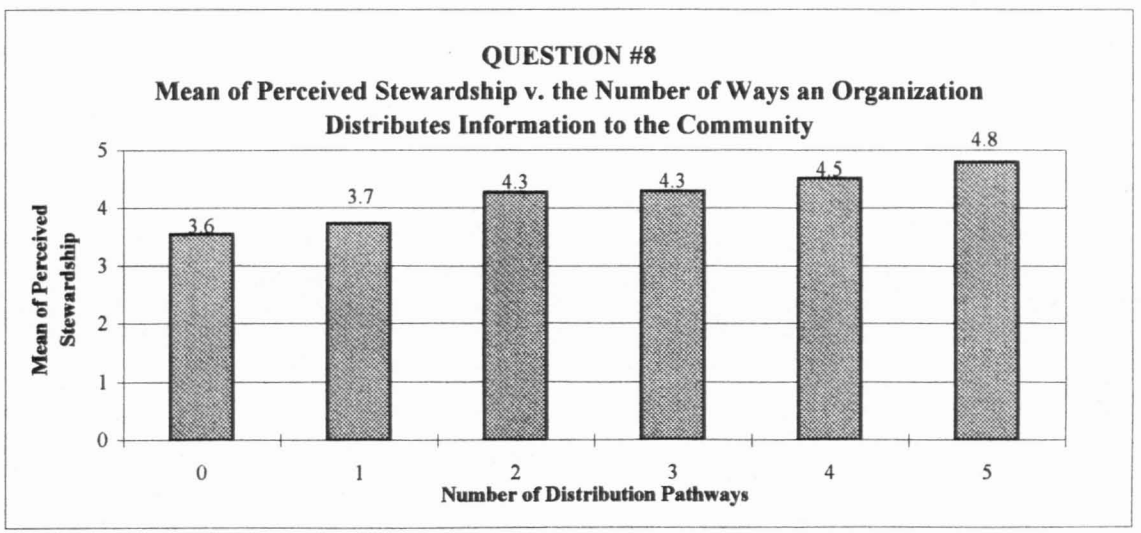
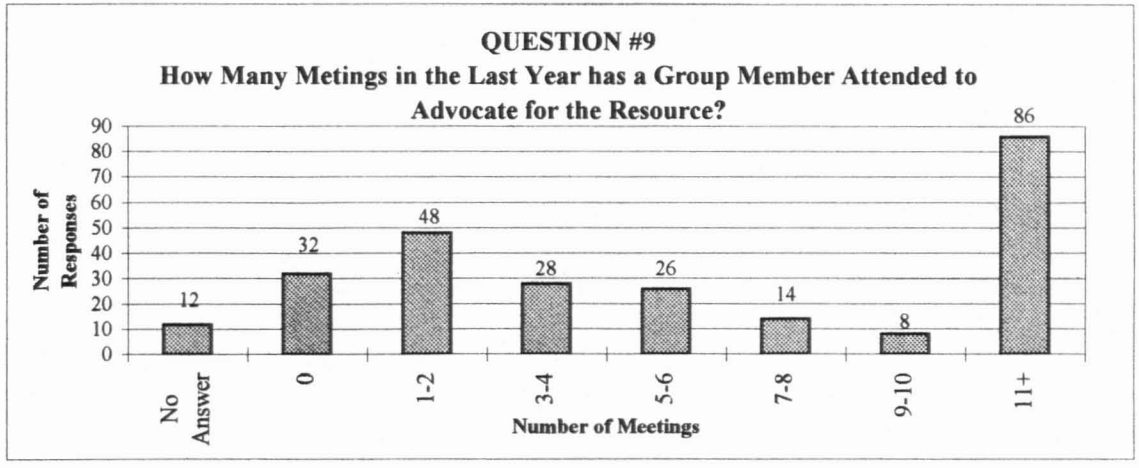


Figure 5a: Response Frequency and Mean Perceived Stewardship Values for Question # 8

Table 3

Significance Tests for the Category: Public Education

Question #	N	Confidence Interval	Significance Test	Z Critical one-tailed	Z Critical two-tailed	Z Obtained	F Score	p
#8. By what means are your organization's goals, findings, and progress distributed to the public?	241	0.95	One-Way ANOVA	---	---	---	5.11	0.0002
#9. How many meetings in the last year has a group member attended to advocate for the resource being monitored?	230	0.95	One-Way ANOVA	---	---	---	3.11	0.006
#16. When problems are located, does your group provide remediation information?	228	0.95	Z obtained	1.64	1.96	2.92	---	---
#12. What is your organization's primary goal?	209	0.95	One-Way ANOVA	---	---	---	0.39	0.76



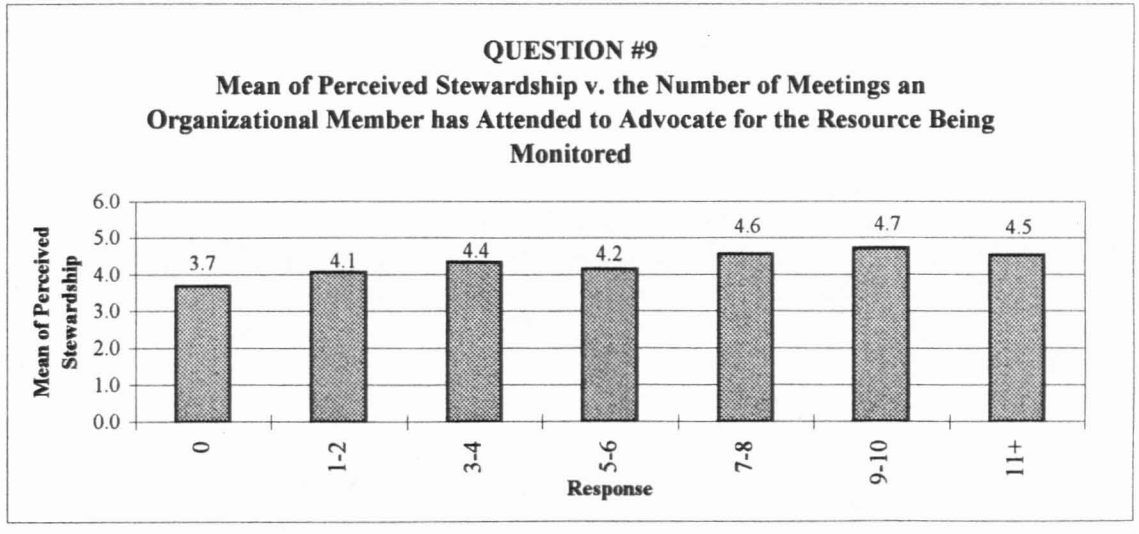
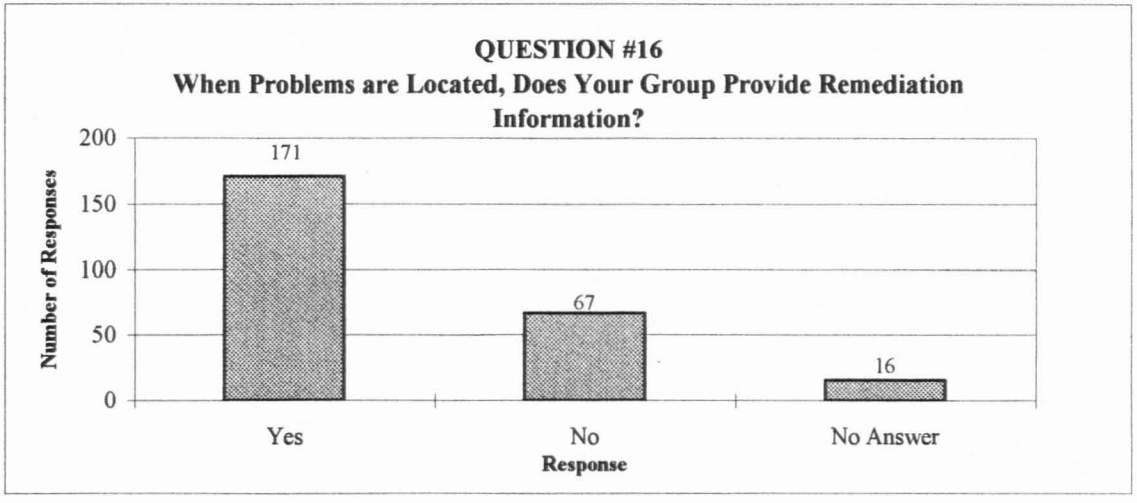


Figure 5b: Response Frequency and Mean Perceived Stewardship Values for Question # 9

over the past year. It was expected that differences would be more apparent, and one explanation for the lackluster findings could be that some areas simply do not have many public meetings per year where resource issues are discussed. Because attending public meetings was used as a surrogate for advocacy, other variables which directly measure advocacy, such as the number of volunteers calling or sending letters to government representatives, may have produced more significant results.

With respect to providing remediation information when problems are located (Figure 5c), statistical results show that groups that did provide remediation information had significantly higher perceived stewardship values than organizations not providing this service (Table 3). While the association between perceived stewardship levels and remediation information remains unclear, there are two potential rationales. First, it may be that individuals were already concerned about the environment, but unaware that a problem existed, or that their actions were negatively impacting the surrounding environment. Simply shedding light on the situation was enough to correct the problem, and the information was appreciated. Second, positive responses could be the result of the constructive nature of the criticism. Instead of just identifying problems and placing blame, organizations providing remediation information are at the same time instructing and educating in a non-confrontational manner.

With regards to an organization's primary goal, it was interesting that no statistically significant differences in perceived stewardship levels were uncovered (Table 3). Respondents were asked to choose from four choices: long-term ecological monitoring, advocacy, education, and other. Of the responding groups 41% listed long-term monitoring as the primary goal, 27% listed education, 12% selected 'other', and 7%



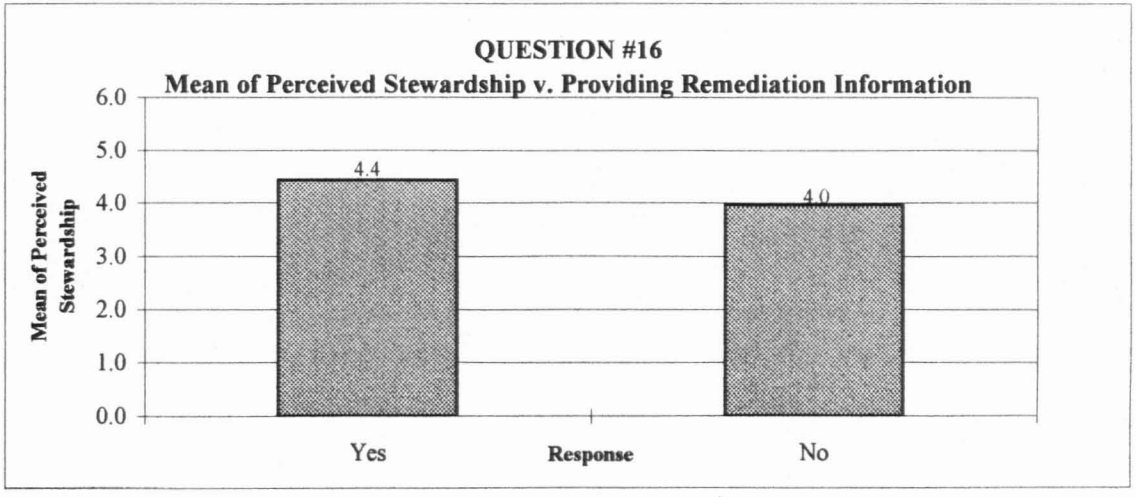


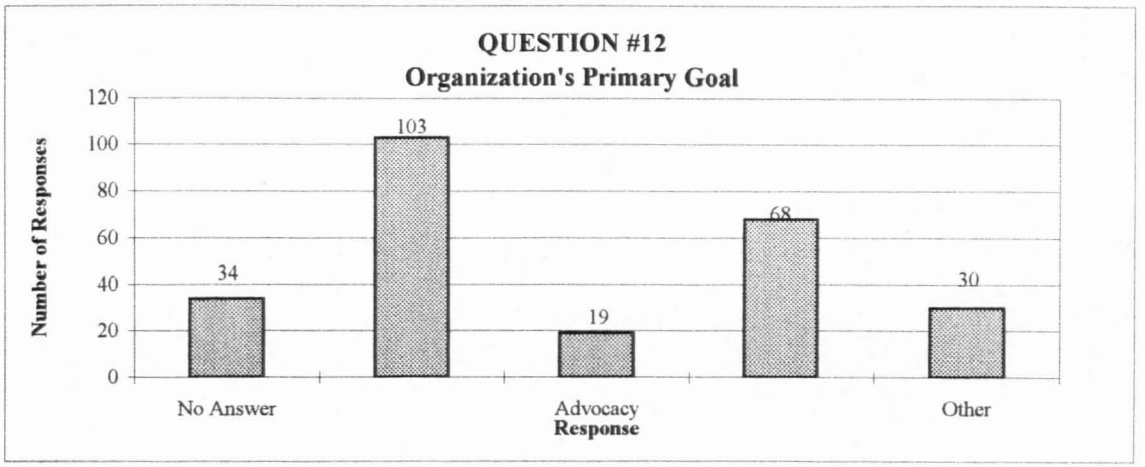
Figure 5c: Response Frequency and Mean Perceived Stewardship Values for Question # 16

selected advocacy as the group's primary goal (Figure 5d). Though the lack of significant differences was not totally unexpected, what was a bit surprising was that the 'other' choice was not significantly different from the alternate selections. On the survey instrument, space was provided to list an organization's goal if 'other' was selected. In each instance the filled in response was the monitoring of a very specific resource, ie. protecting loon habitat or assuring safe shellfishing. Due to the highly specialized nature of these monitoring groups, it was assumed that greater community support would exist for these localized issues, resulting in higher perceived stewardship values for the community.

While specific differences were not identified in each instance, statistically significant differences were identified in many of the public education areas. Public education provides another means for an organization to link the community to the resource through direct cause and effect relationships, and at the same time, establishes the need for action.

Volunteer Behavior

The third broad category that was investigated for a relationship to the building of public stewardship was volunteer behavior. If an organization desires to build stewardship within the community, traditional manners of thinking about, and utilizing the resource must be altered, if behavioral changes are to be successful. One strong point of volunteer organizations is that all members, just by joining the group, have shown a desire to protect or conserve the resource in question. By educating and encouraging members to act in an appropriate manner, the influence of a group grows, as members interact within their individual neighborhoods and social circles.



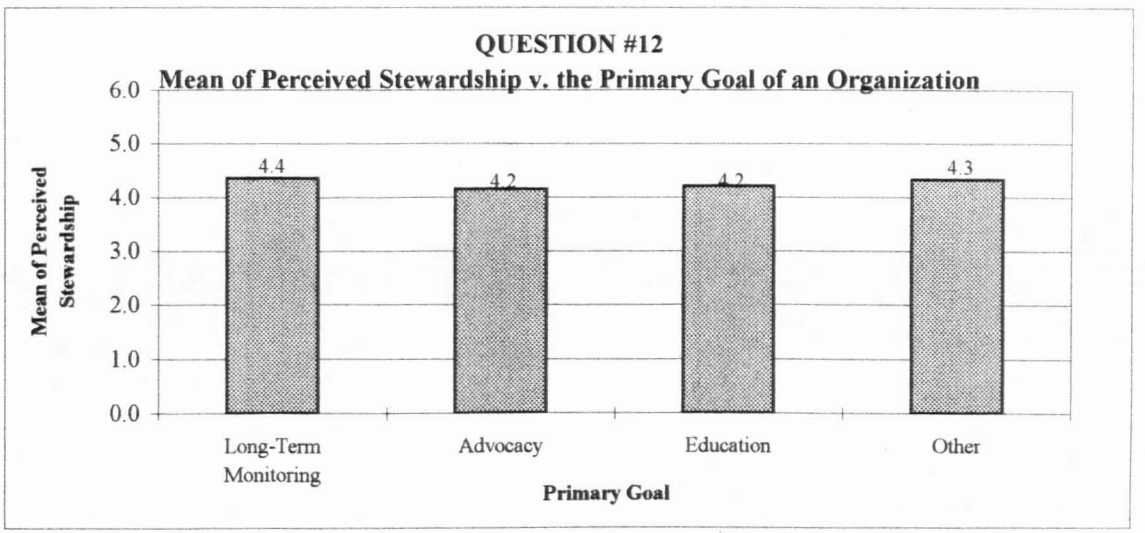


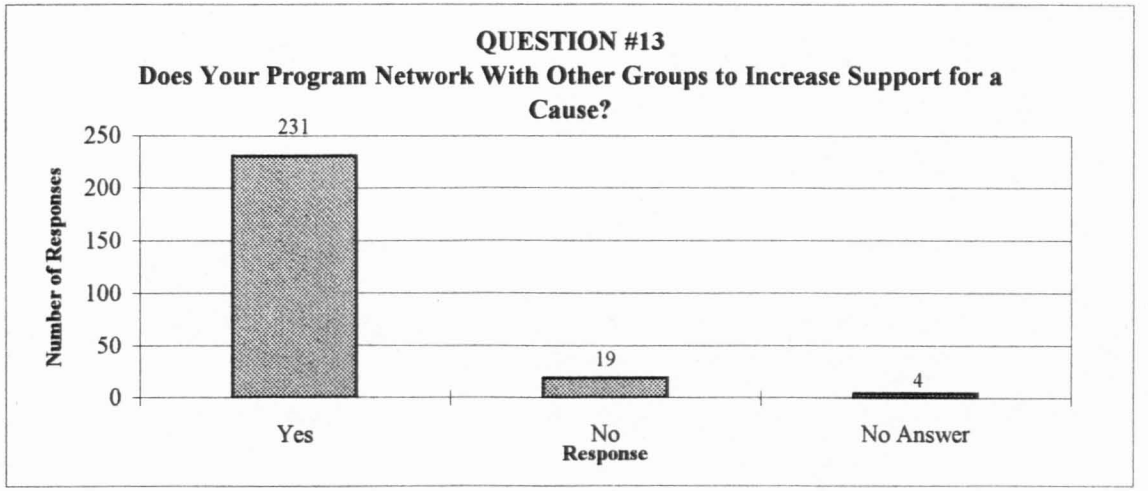
Figure 5d: Response Frequency and Mean Perceived Stewardship Values for Question # 12

Five areas of volunteer behavior were studied to determine what associations, if any, exist between perceived stewardship values in a community, and an organization's effort to solicit correct behavioral actions: Does an organization link/network with other groups to increase support for a cause? (q. 13); Does the volunteer group provide information to volunteers concerning environmentally responsible action they can practice at home? (q. 15); How many times per year does the entire group meet, and during these group meetings, are volunteers encouraged to voice their concerns, comments, and ideas? (q. 21a,b); and Are volunteers encouraged to participate in the political process behind environmental decision-making? (q. 20).

Of the groups responding to the survey, 91% stated that they do network with other groups to increase the support for their cause (Figure 6a). The Z(obtained) test for significance indicates that these groups also have significantly higher perceived stewardship values than organizations not choosing to network (Table 4).

Figure 6b displays the frequency of response and mean perceived stewardship values for whether or not a volunteer organization provides information to volunteers concerning environmentally responsible behaviors they can practice at home. Groups providing this information to volunteers had significantly higher perceived stewardship values than other organizations (Table 4). Again, by educating volunteers, monitoring groups are able to tie individual actions to the health of the resource, they are able to offer alternatives, and they show how individuals can make a difference.

There were however, no significant differences in perceived stewardship values based on the number of meeting a group had per year (Table 4). These results were not anticipated; it was expected that by having a larger number of meetings per year,



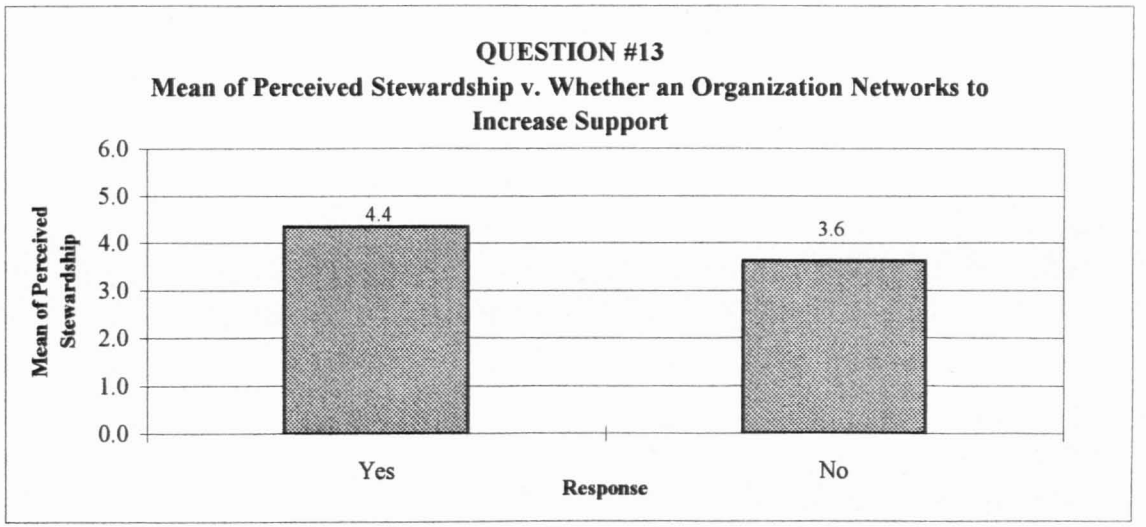


Figure 6a: Response Frequency and Mean Perceived Stewardship Values for Question # 13

Table 4

Significance Tests for the Category: Volunteer Behavior

Question #	N	Confidence Interval	Significance Test	Z Critical one-tailed	Z Critical two-tailed	Z Obtained	F Score	p
#13. Does your organization network with other groups to increase support?	237	0.95	Z obtained	1.64	1.96	2.60	---	---
#15. Does your organization provide information to volunteers concerning environmentally responsible actions they can practice at home?	236	0.95	Z obtained	1.64	1.96	2.35	---	---
#21a. How many times per year does the entire group meet?	233	0.95	One-Way ANOVA	---	---	---	1.52	0.17
#21b. During group meetings, are volunteers encouraged to voice their concerns, comments, and ideas?	178	0.95	Z obtained	1.64	1.96	2.90	---	---
#20. Does your group encourage volunteers to participate in the political process behind environmental decision making?	237	0.95	Z obtained	1.64	1.96	0.76	---	---

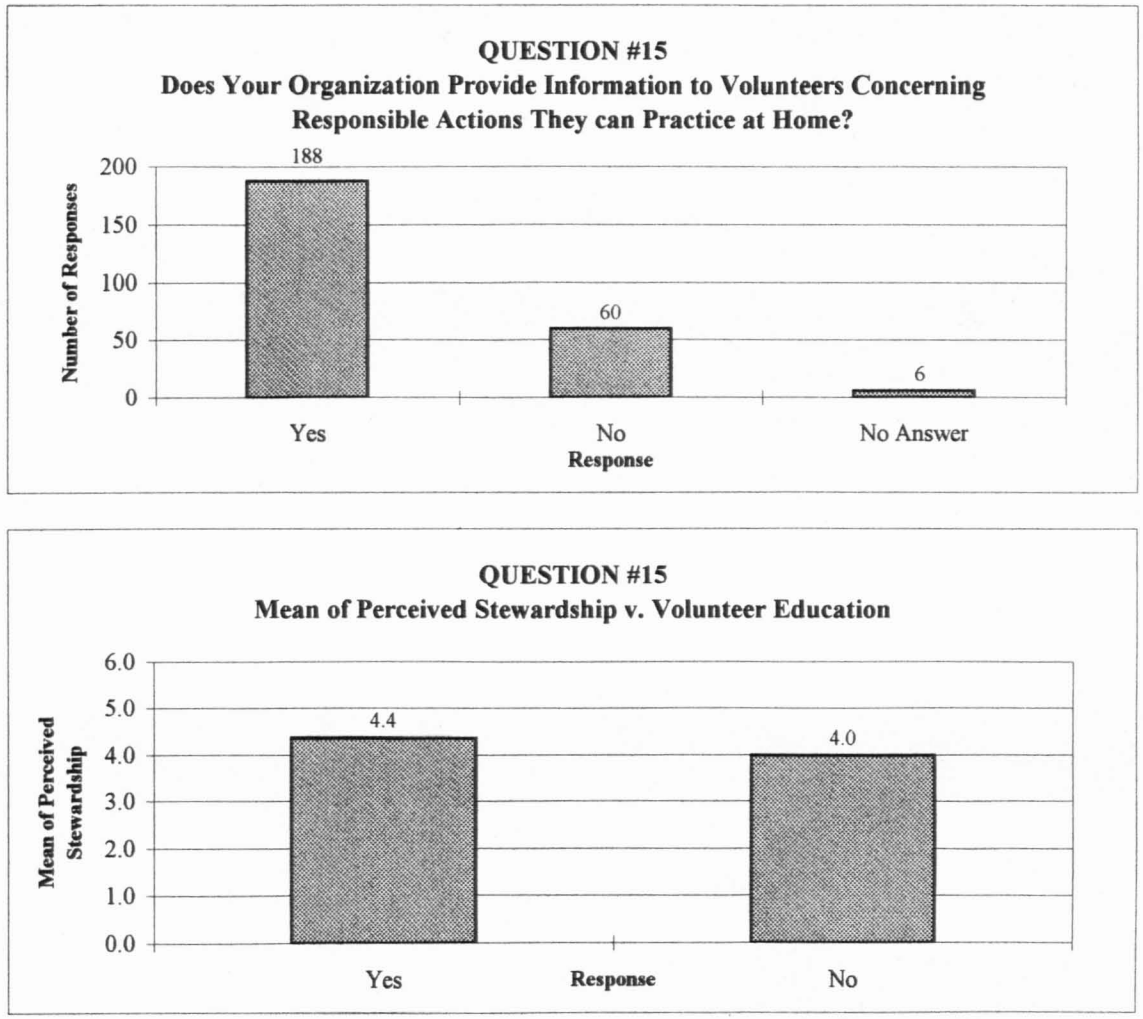


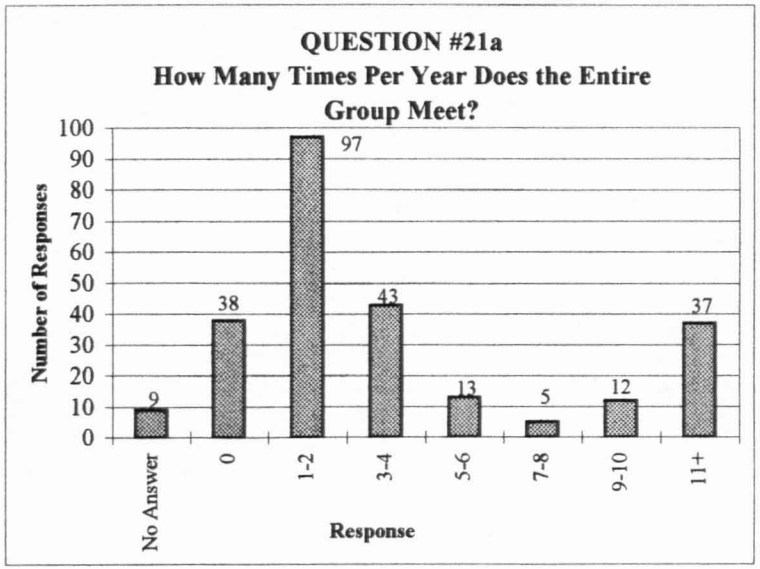
Figure 6b: Response Frequency and Mean Perceived Stewardship Values for Question # 15

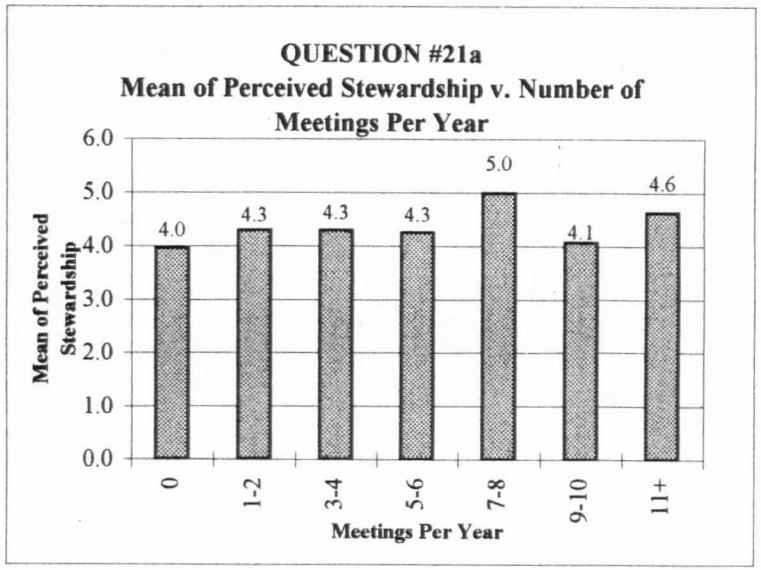
volunteers would remain better informed, and not become disenchanted with the lack of immediate changes to the environment. Though the number of meetings per year did not significantly effect perceived stewardship levels, organizations which encouraged volunteers to offer their concerns, comments, and ideas during these meetings had significantly greater perceived stewardship values (Table 4). These results were expected, because if an individual doesn't feel that his or her actions make a difference, or that their concerns are important to the group to whom they are devoting time and energy, it would be likely that motivation/enrollment would be low. Figure 6c shows the response frequencies and associated means of perceived stewardship values for question 21a, b.

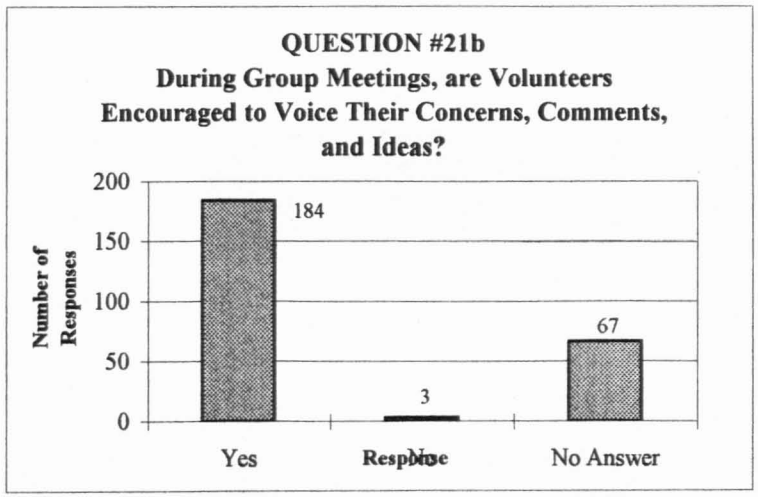
The final area of concern in the category of volunteer behavior was whether volunteers were encouraged to participate in the political process behind environmental decision-making. Although 77% of the responding organizations did state that volunteers were encouraged to participate in the political process (Figure 6d), no significant differences in perceived stewardship levels were discovered (Table 4). These results were not entirely unforeseen; political lobbying is not a highly visible action, and few individuals, regardless of their concerns, are motivated enough to do it. Perhaps more positive results would have been obtained had the question compared the number of politically active volunteers within each group, rather than simply asking whether an organization provided the encouragement for action.

Community Involvement

The last category selected for analysis in this study was community involvement. Community involvement is really made up of two parts. The first is the assertion in the







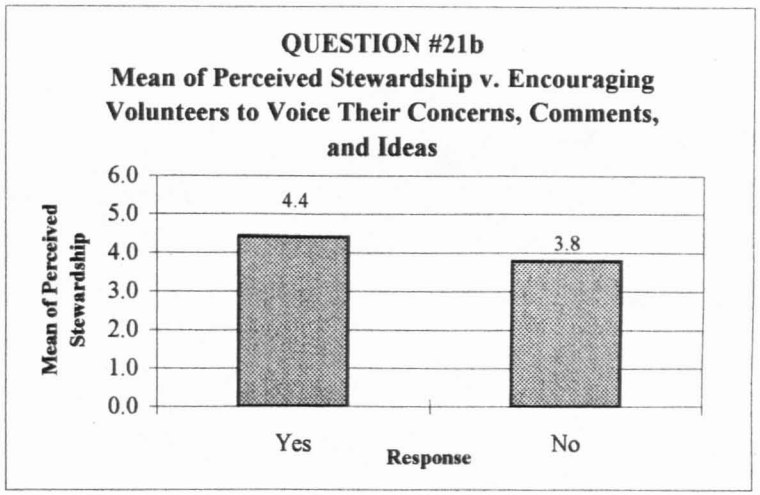
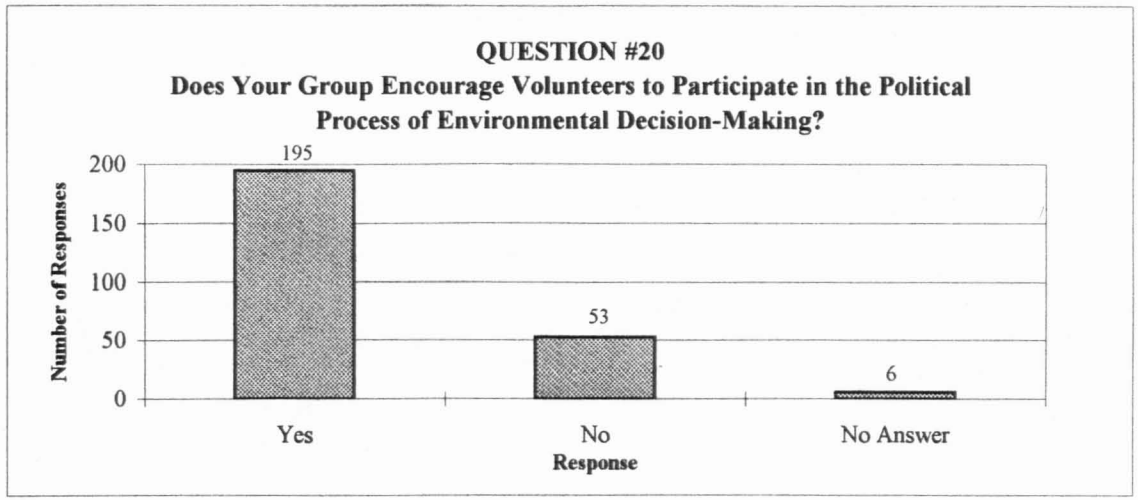


Figure 6c: Response Frequency and Maen Perceived Stewardship Values for Questions # 21a,b



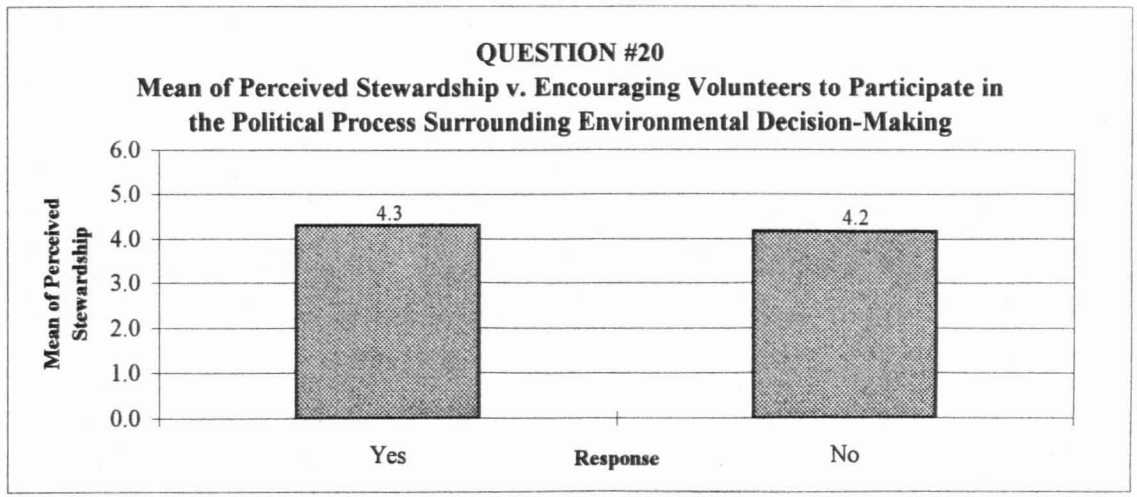
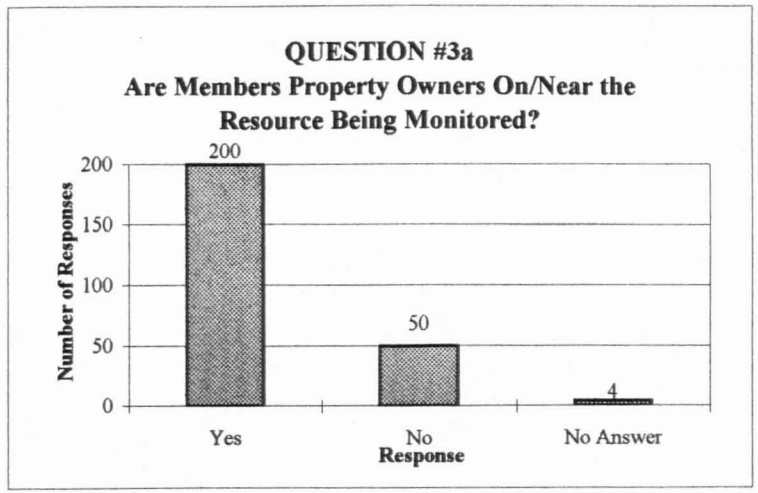


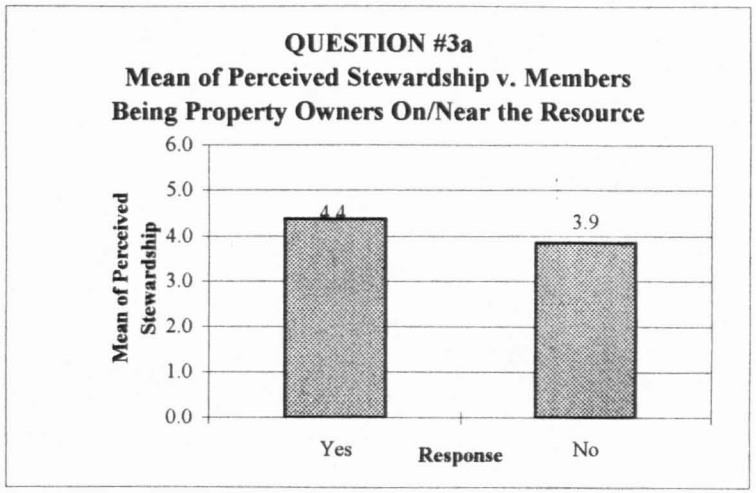
Figure 6d: Response Frequency and Mean Perceived Stewardship Values for Question # 20

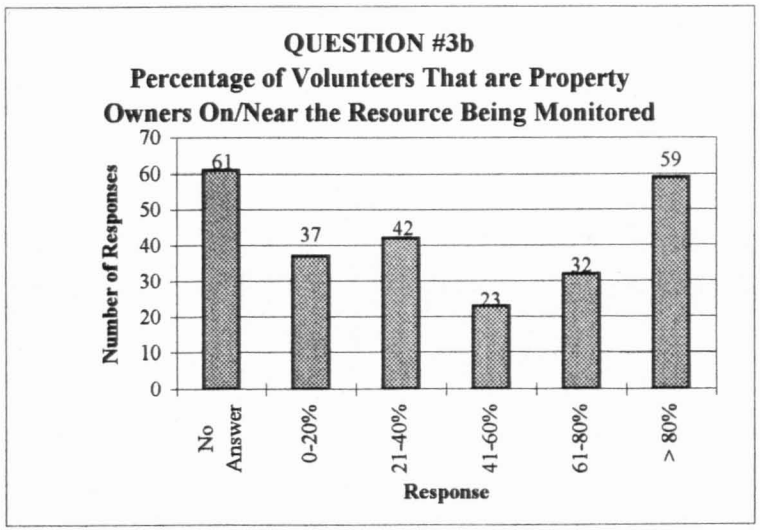
literature that people from all walks of life must work together, creating an air of cooperation through which equitable programs may be developed and implemented. Second, the community itself must develop a tangible link to the resource and begin to take responsibility for the condition of surrounding resources. To investigate the influence of community involvement on perceived stewardship, four areas were picked for analysis: Are group members property owners on or near the resource, and if so, approximately what percentage? (q. 3a,b); How many outings has the group sponsored over the past year to promote the resource? (q.10); What is the diversity of the organization's membership base? (q. 17); and Are any local businesses promoting the resource? (q. 18).

When asked if volunteers were property owners on/near the resource being monitored, 79% of the groups responded positively (Figure 7a). This question is somewhat different from an earlier inquiry as to whether property values depended on the condition of the resource. Where property values are beyond the control of a volunteer organization, and represent a pre-existing condition, recruiting volunteers from a section of the community that already has a tangible link to the resource could easily be an aim of most organizations. This question tested specifically whether or not groups were actively utilizing this potentially effective segment of the population.

Results from this question showed that groups that have not effectively recruited local property owners did indeed have lower perceived stewardship levels (Table 5). This type of relationship was anticipated, due to the assumption that people living on/near the resource would be more likely to develop concerns about the health and quality of the environment. Organizations responding positively (Figure 7a), were then asked the







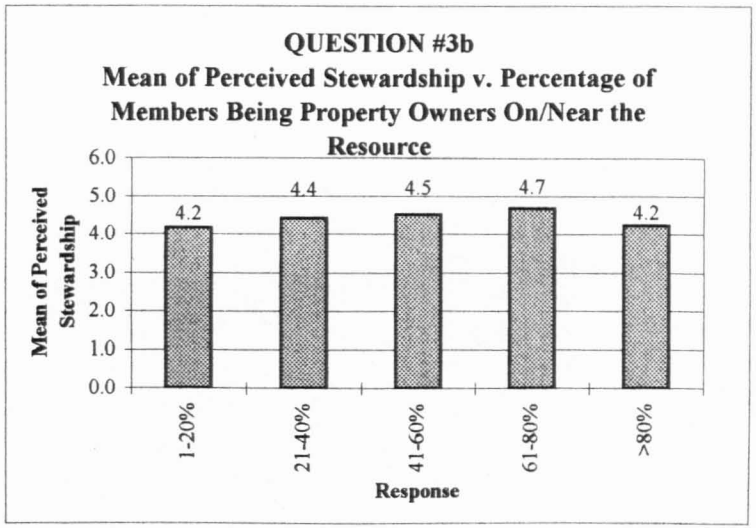


Figure 7a: Response Frequency and Mean Perceived Stewardship Values for Questions # 3a,b

Table 5

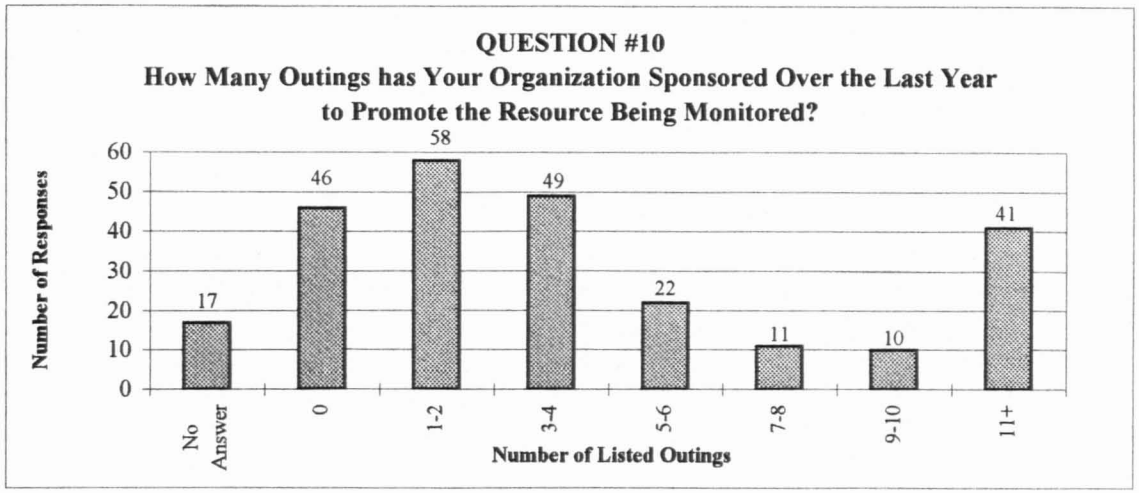
Significance Tests for the Category: Community Involvement

Question #	N	Confidence Interval	Significance Test	Z Critical one-tailed	Z Critical two-tailed	Z Obtained	F Score	p
#3a. Are group members property owners on/near the resource being monitored?	239	0.95	Z obtained	1.64	1.96	3.03	---	---
#3b. If members are property owners, what is the approximate percentage?	185	0.95	One-Way ANOVA	---	---	---	1.37	0.25
#10. How many outings has your group sponsored over the past year to promote the resource being monitored?	227	0.95	One-Way ANOVA	---	---	---	2.91	0.01
#17. Which of the following groups of people are represented in your organization?	241	0.95	One-Way ANOVA	---	---	---	4.83	0.0001
#18. Are local businesses promoting the resource?	223	0.95	Z obtained	1.64	1.96	3.93	---	---

approximate percentage of their membership base made up of these property owners. Results from this part of the question were unexpected, in that no statistically significant differences were found (Table 5). In other words, having members that were property owners on/near the resource lead to higher perceived stewardship levels, however, increasing the percentage of this segment of the community had no observable impacts.

The next area investigated in the community involvement category was the relationship between the number of outings sponsored by the organization to promote the resource, and perceived stewardship (Figure 7b). The ANOVA procedure did indicate that significant differences existed (Table 5), but Scheffe's multiple comparison test was unable to isolate those differences. Tukey's HSD multiple comparison, however, placed the difference between groups having no outings, and those having 7-8 per year.

The effects of having a diverse membership base were also investigated. For this study, ethnic diversity was not addressed, rather diversity was used to measure the presence or absence of much broader socioeconomic groupings within the community (q. 17). Again, the importance of one group over another was not considered; only the effects of having many different groups of people represented was observed (Figure 7c). While the one-way ANOVA did indicate the presence of statistically significant differences (Table 5), the multiple comparison tests were unable to isolate those differences. The inability of the multiple comparison tests to identify the placement of the differences could be due to the large number of categories for this question (10). Differences might have been better exposed if the number of choices were collapsed into fewer categories. For example, scientists, teachers and university personnel could be collapsed into the more general category of educators.



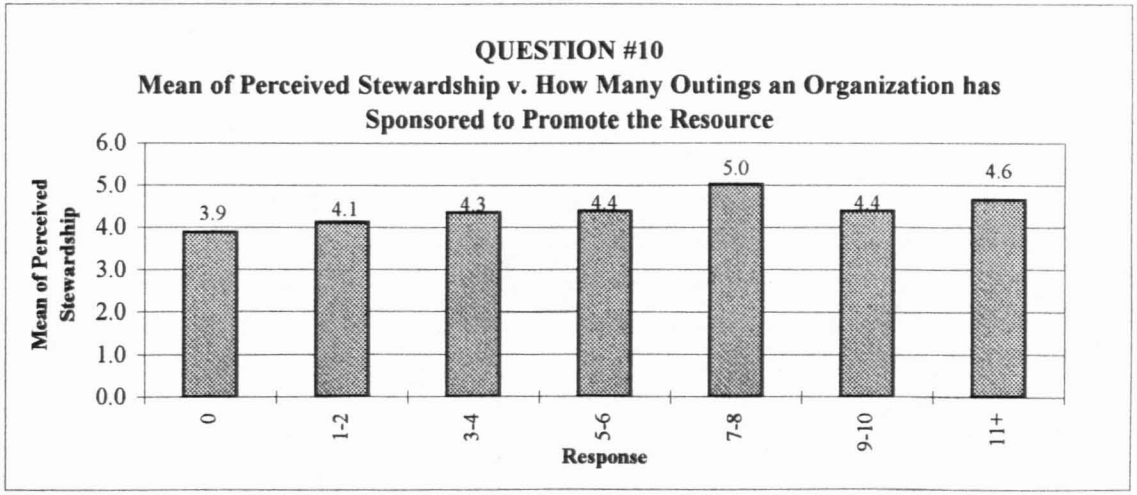
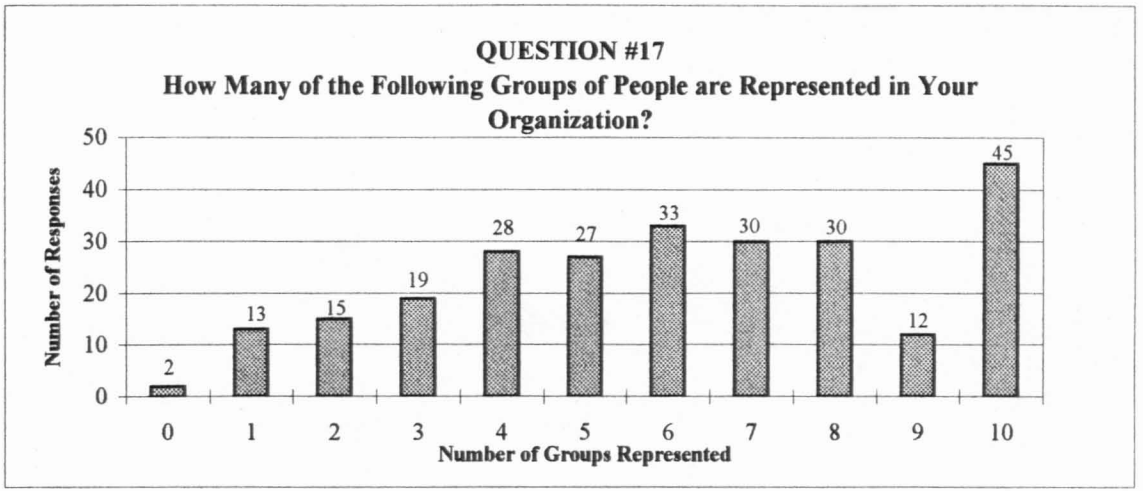


Figure 7b: Response Frequency and Mean Perceived Stewardship Values for Question # 10



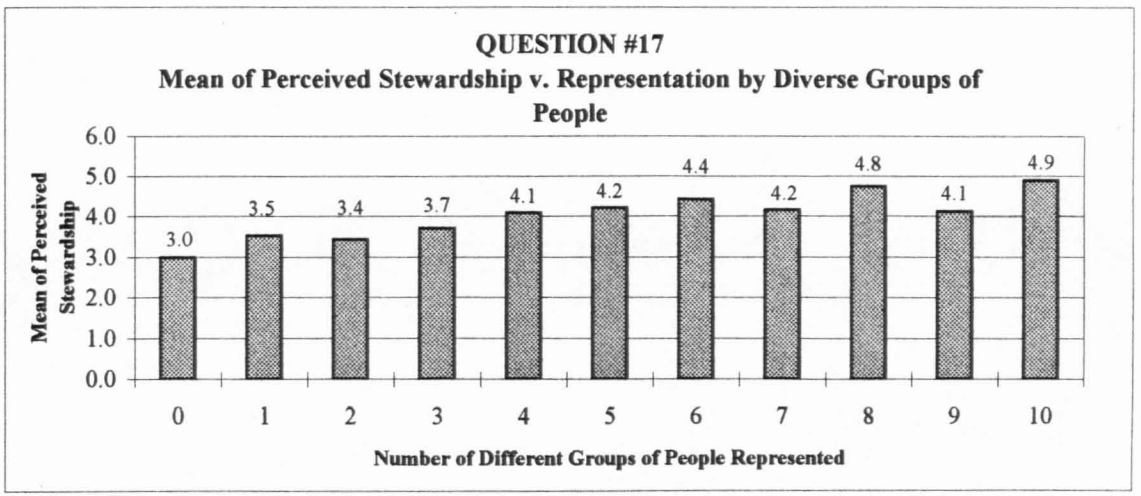


Figure 7c: Response Frequency and Mean Perceived Stewardship Values for Question # 17

Finally, differences were sought between communities where local businesses were promoting the resource, and areas where they did not (Figure 7d). The underlying assumption for this question was that through promotion, area businesses could be used to foster stewardship by encouraging use, thus generating a link between the community and the resource. Results indicate that this is a plausible premise (Table 5); areas where local businesses were promoting the resource had significantly greater perceived stewardship values than communities not utilizing this option.

Summary

For this study, four broad categories of public involvement were chosen for analysis which were deemed indicative of stewardship building activities: pre-existing conditions, public education, volunteer behavior, and community involvement. In order to test each of these areas, questions were constructed to test variables which were not specific to any one type of program, and would likely have the greatest appeal and relevance for the largest number of organizations. The responses to each survey question were aggregated, and relationships were sought between how a volunteer organization perceives stewardship within the community, and the activities it engages in.

Overwhelmingly it was shown that efforts by an organization to educate a community, and to link that community to the resource, were associated with statistically higher perceived stewardship values. Using these results, the applicability of the hypotheses put forth for this study can be assessed.

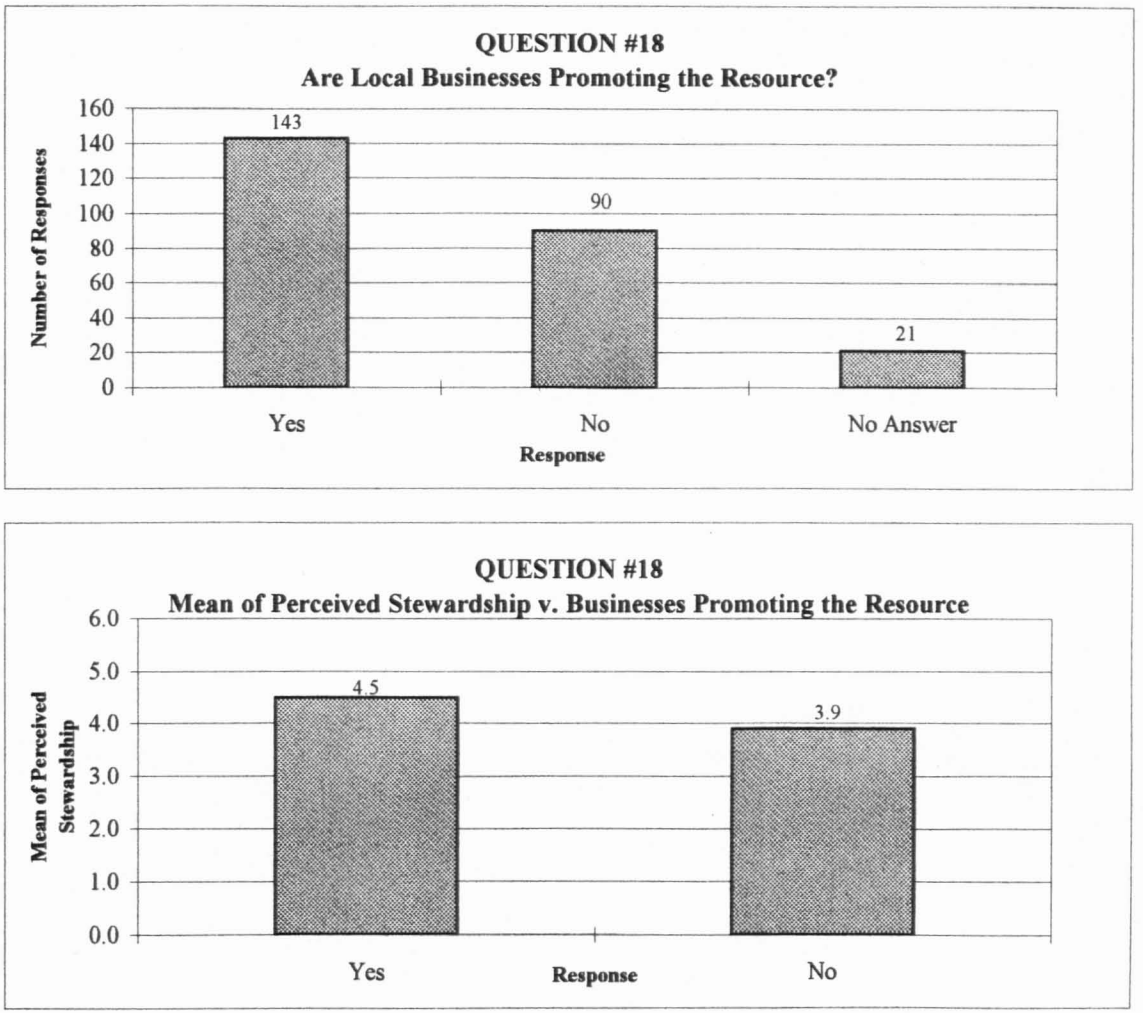


Figure 7d: Response Frequency and Mean Perceived Stewardship Values for Question # 18

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Conclusions

For the purposes of this study, four areas of public participation were chosen for investigation which were believed to be important in the evolution of public stewardship. Though this study has investigated these four potential areas of concern, in reality, the boundaries delineating these categories are indistinct, and there is probably considerable overlap between the categories.

The first hypothesis for this study was:

The extent to which a volunteer monitoring program perceives their success at building stewardship within the community will depend upon:
1. how a community has traditionally utilized the resource; and/or
2. the scope of their public education program

This hypothesis consists of two parts, and seeks to ascertain the effects of pre-existing conditions on the perceived success of an organization, and the perceived effects of a diverse public education program. Note that both portions of the hypothesis need not be positively supported to accept this hypothesis. For instance, in a community where property values are not tied to the condition of the resource, or the resource is not used as a source of drinking water, volunteer organizations focusing their efforts on linking all facets of a community to the resource, will have higher perceived stewardship levels than groups in similar circumstances that have not reached out to the community.

Because this is a two part hypothesis, each section was evaluated individually. The first part of the hypothesis states that how an organization perceives stewardship building within the community, will depend upon conditions existing prior to the formation of a

volunteer monitoring group. In areas where property values depend upon the condition of the resource, the resource was used for drinking water, or there had been a previous threat to the resource, perceived stewardship values were higher than in locales where these conditions were not met. Though monitoring groups have no control over these circumstances, they can use these situations to their advantage, especially when forming a new monitoring group.

One pre-existing condition that monitoring groups can influence is the utilization of the resource being monitored. Results from this study have shown that community utilization of the resource is related to larger perceived stewardship levels by local monitoring groups. In addition, the larger the number of uses, the greater the perceived stewardship level. By promoting environmentally responsible uses of the resource, monitoring groups are potentially able to increase stewardship levels in the community by strengthening an individual's link to the resource. Individuals that utilize and appreciate the resource are more inclined to want to preserve it, and become an important source of new volunteers.

The results exhibit the potential importance of pre-existing conditions, and have shown that an area's individual circumstances may play an effective role in generating stewardship; an example of this being statistically greater perceived stewardship values in communities where property values are tied to the condition of the resource. It is not to be said however, that existing conditions directly translate into greater perceived stewardship levels with little action. What is more likely the case is that these areas have a greater initial potential to build stewardship, but it takes the organization and oversight by a monitoring group to draw concerned parties together to achieve a common goal.

The second portion of the hypothesis states that perceived stewardship levels will depend upon the extent of an organization's public education program. Results from this study also support this portion of the hypothesis. This work has shown that distributing information to the public, educating volunteers, sponsoring outings promoting the resource, advocating at public meetings, networking with other organizations, and providing remediation information when problems are located, were all linked to higher perceived stewardship levels in the communities where these actions were being performed.

These findings support earlier works attesting to the importance of involving and informing the public (Pierce and Doerksen, 1976; Rosenbaum, 1976; Institute for Participatory Planning, 1978; Hudspeth, 1986; Grisham, 1988; and Carroll and Hendrix, 1992). Each of these studies discusses the importance of incorporating local interests and concerns in a program, to build a level of trust between an organization and the community. Along with generating trust, involving the public helps to pave the way for successful programs by gaining the support of the local government and community.

In addition to educating the public, what these activities do is directly tie the public to the resource through cause and effect relationships, and show how individuals can make a difference in the well-being of the environment. This work also supports the recommendations of McKenzie (1981), who identified three main criteria for increasing public involvement: 1) directing the program towards individuals who may have not had experience in decision-making in the past, or those who lack the confidence and skills necessary for a group decision-making process; 2) encouraging the formation of informal groups where issues can be casually discussed; and 3) avoiding abstract goals. While volunteer monitoring groups are in a unique position to address each of these points within

their organization, it was unknown prior to this study, how effectively these concerns could be projected into the community. The results of this work in the areas of public education (Table 3 p.48) and community involvement (Table 5 p.63) show that these ideals have the ability to be projected into the community to increase the level of perceived stewardship.

The second hypothesis for this study was:

> **In areas where resource protection has been of little concern, such as in inner-city settings, programs which seek to involve the public through resource promotion and education will have a greater perceived sense of stewardship than groups which have not attempted to link the community to the resource.**

Though impossible to draw any conclusions specific to inner-city areas, conclusions could still be made for areas where resource protection has traditionally been of little concern. In these types of areas, a lack of concern might translate into no businesses promoting the resource, little effort at educating the public, and no outings sponsored by a monitoring group to promote resource use and get the public involved. In this type of environment, deliberate efforts must be made to link the public to the resource.

Again, data obtained from the survey supports this hypothesis. Organizations which attempted to educate and get the public involved consistently had higher perceived stewardship levels than organizations not attempting to establish links between the community and the resource. Though the literature on attitude/behavior studies has not arrived at a concrete conclusion that attitudes positively effect behavior, Shuman and Johnson (1976), Borden and Schettino (1979), Fortner and Teates (1980), and Soden (1989) have all indicated that positive relationships do exist, though not necessarily in a strong and consistent manner. These inconsistencies were highlighted in this study with respect to the findings of questions three (3) and six (6). In both cases, perceived

stewardship levels were significantly higher in communities where members were property owners on/near the resource (q. 3), and the resource was used as a source of local drinking water (q. 6). However, increasing the percentage of the community that either lived on/near the resource, or were knowledgeable of the drinking water source, did not translate into significantly larger perceived stewardship values.

Results lend support to the supposition that individuals more knowledgeable about resource protection are more likely to support resource protection programs (Soden, 1989), and that a positive relationship exists between knowledge and attitudes (Fortner and Teates, 1980). Utilizing multiple pathways for distributing information to the public, attending public meetings to advocate for the resource, and providing remediation information when problems are located, were all tested for within the category of public education (Table 3 p.48), and in each case organizations performing these actions had significantly greater perceived stewardship levels than groups not performing these actions.

When trying to educate the public, one action that should not be underestimated is providing remediation information when problems are located. Results show (Table 3 p.48) that volunteer organizations that bring a problem to the attention of a property owner, and discuss problem solving techniques have a significantly higher perceived stewardship level. While it is unknown exactly what the relationship is between perceived stewardship and providing remediation information, it may be partially explained by the persuasive communication premise put forth by Cook and Berrenberg (1981). Essentially what this premise says is that persuasive communication is effective when aimed at people with pro-conservation attitudes that a) may not know of an existing problem,

or b) do not connect an action with being conservation oriented. In cases such as this, information is distributed with the hope of invoking the appropriate behavior.

It may be that some areas are easier to build stewardship in because of past or present circumstances, but this does not eliminate the possibility of generating stewardship in areas where resource protection has been given little thought. If nothing else, this work has demonstrated that by focusing activities in a few key areas, monitoring groups have the potential to stimulate stewardship development within the community through well-designed public involvement campaigns.

Using the data obtained from this study, recommendations can be made to guide the actions of new or existing volunteer programs that have a desire to build stewardship. Results from this study support both hypotheses that volunteer organizations that have attempted to link the community to the resource through public involvement, consistently had higher perceived stewardship levels than other organizations.

For each of following areas of public involvement, the listed activities were associated with significantly higher perceived stewardship levels at a 95% confidence interval:

Pre-Existing Conditions

- the community utilized the resource being monitored
- local property values were tied to the condition of the resource
- the monitored resource was used for drinking water
- there had been previous threats to the resource

Public Education

- an organization distributed its goals, findings, and progress to the community
- group members attended public meetings to advocate for the resource
- remediation information was provided when problems were located

Volunteer Behavior

- the volunteer group networked with other organizations
- volunteers were educated on environmentally responsible behaviors they could practice at home
- volunteers were encouraged to voice their concerns, comments, and ideas

Community Involvement

- organization members were also property owners on/near the resource being monitored
- the organization sponsored outings to promote the resource
- the group had a diverse membership base
- local businesses were promoting the resource

Results from this study indicate that public involvement has the potential to be an important component in the generation of perceived stewardship by volunteer monitoring organizations. Though it is not possible to delineate causal relationships between performing the listed activities and the generation of perceived stewardship, strong associations do exist and should be investigated further. While beyond the scope of this study, future work in this area should assess the relationship(s) between a volunteer group's perception of stewardship, and the actual measurement of stewardship values within the community. This would benefit monitoring organizations by demonstrating the effectiveness of their campaigns, and represents the next step in assessing the causality between public involvement activities and generating stewardship.

In addition, cluster or factor analyses may be used to test the appropriateness, and better define the four divisions of public involvement used for this study: pre-existing conditions, public education, volunteer behavior, and community involvement. As was previously stated, there is probably considerable overlap between the four areas of public involvement chosen for this study, and it may be possible to further reduce the number of activities that are effective in generating perceived stewardship within a community.

The importance of a public involvement campaign should not be underestimated by existing or future volunteer monitoring groups. As this study has shown, an effective public involvement campaign has the potential to produce measurable results with respect to a volunteer monitoring organization's perceived stewardship levels. Each organization must assess the specific qualities of their area, and design a program which utilizes the strengths of a community to achieve the desired success.

Appendix A

Cover Letter and Survey Instrument

The University of Rhode Island, Narragansett, RI 02882-1197
Coastal Resources Center 401) 792-6224 Fax: (401) 789-4670

October 27, 1995

Dear Monitoring Program Coordinator,

Working in conjunction with Meg Kerr and Virginia Lee from the University of Rhode Island's Coastal Resources Center, I have initiated a study which takes an in-depth look at volunteer monitoring programs. This work will attempt to identify the linkages that exist between citizen monitoring and the evolution of public stewardship. Because grass roots information such as this can only be gathered from the monitoring organizations themselves, I am requesting that you please take a moment to fill out the enclosed survey, and return it as soon as possible in the envelope provided, or by faxing it to the number on the bottom of the survey instrument.

We feel that there are a number of important criteria which can facilitate the development of public stewardship if the desire exists. The four major stewardship-building categories which we will explore are pre-existing conditions, communal involvement, volunteer behavior, and public out-reach. For our work we have developed a definition of public stewardship based in part upon *The Land Ethic* in Aldo Leopold's A Sand County Almanac and Sketches Here and There (1949). Our definition is:

> Public stewardship is the willingness of people to be liable for their actions and the resulting state of the surrounding resources. Public stewards recognize the societal obligations beyond their own short-term monetary interests, and have chosen to hold the world's resources in trust for future generations.
>
> For the public steward, the boundaries of their community have been expanded to include the air, water, animals, plants and soils. Value for a resource is calculated not through traditional economic means where commodities are bought and sold, but rather from the inherent value the resource possesses. Stewards understand that each element of an ecosystem is essential to the well being and natural functioning of the entire system, with the value of individual ecosystem components being derived from their contribution to the system as a whole.

We recognize that some organizations act as 'parent groups,' coordinating or overseeing a number of smaller monitoring entities. If your organization falls under this category, please forward the survey instrument to the satellite groups for their submission, or list on the back of the survey form the name and address of any volunteer monitoring group you feel we should contact. Because your organization may have a number of volunteer monitoring programs, we ask that you fill out the survey for one specific program. You may, however, photocopy the survey and fill out one survey for each volunteer monitoring program.

The information gathered from this study will illuminate the activities currently being practiced most often by citizen monitoring groups, as well as allowing the determination of which factor(s) have the greatest influence on stewardship development. In addition, the

revealed relationships will enable organizations desiring to build stewardship, an efficient method of achieving their goal. Your time and effort are essential in completing this timely study, and are greatly appreciated.

Keeping our definition of stewardship in mind, please turn the page to begin the survey.

Sincerely,

Christopher Damon

Environmental Stewardship Survey

This survey will attempt to identify various activities which increase the likelihood that volunteer monitoring organizations will be able to foster environmental stewardship within their communities. For this particular study we have grouped the questions into four broad categories as follows: pre-existing conditions, public out-reach, communal involvement, and volunteer behavior. Because we recognize that stewardship exists in varying degrees, the grouping of questions will allow the evaluation of each category in order to determine its overall importance in the evolution of stewardship values. If your organization has any information from successful volunteer monitoring programs, we encourage you to send copies along with the completed form. Your time and support are greatly appreciated.

Note: Respondents must be at least 18 years of age. All replies will be held in confidence.

Name of person completing questionnaire: _____
Name of volunteer monitoring program: _____
Program coordinator: _____
Number of active volunteers: _____
Approximate annual budget: _____
Phone number: _____

1. Please rank the successfulness of your organization at building stewardship for the resource being monitored: (indicate your response with a vertical line '|')
   0---------1---------2---------3---------4---------5---------6
   no success somewhat very successful

2. Please rate the quality of data collected by your volunteers:
   - ☐ Government approved QA/QC plan
   - ☐ Regular QA/QC activities, but no government approved plan
   - ☐ Some QA/QC, mostly emphasize education
   - ☐ Qualitative data only
   - ☐ Don't know

3. Are members of your organization property owners on/near the resource being monitored? ☐ Yes ☐ No
   If yes, please check the approximate percentage:
   ☐ 1-20% ☐ 21-40% ☐ 41-60% ☐ 61-80% ☐ >80%

4. Does the community utilize the resource? ☐ Yes ☐ No
   If yes, please check all the ways the resource and surrounding area is utilized:
   ☐ canoeing/kayaking ☐ picnicking ☐ swimming ☐ camping
   ☐ power boating ☐ fishing ☐ bird watching ☐ Other

5. Do local property values depend in part upon the condition of the resource? ☐ Yes ☐ No

6. Is the resource used as a source of drinking water for the community? ☐ Yes ☐ No
   If yes, please check the approximate percentage of the community that is aware of where their water comes from:
   ☐ 1-20% ☐ 21-40% ☐ 41-60% ☐ 61-80% ☐ >80%

7. Has there ever been a large threat to the resource? (i.e. dam proposal, major discharges, major water withdrawal) ☐ Yes ☐ No

8. By what means are your organization's goals, findings and progress distributed to the community? (check all that apply)
   ☐ newsletters ☐ public meetings ☐ educational displays
   ☐ festivals ☐ outings promoting the resource

9. Within the past year, how many public meetings has a representative of your organization attended to advocate for the resource?
   ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 11+

10. During the past year, how many outings has your organization sponsored promoting the resource you are monitoring?
    ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 11+

11. What type of area best describes the location of the resource being monitored? (check all that apply)
    ☐ urban ☐ inner city ☐ suburbs ☐ rural

12. What is the primary goal of your program? (check only one)
    - ☐ long-term ecological monitoring
    - ☐ advocacy
    - ☐ education
    - ☐ other_____

13. Does your program link/network/coordinate with other groups or organizations to increase the level of support and concern? ☐ Yes ☐ No

14. How many public access points are provided on the resource?
    ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 11+

15. Does your organization provide information to the volunteers on environmentally responsible actions they can practice at home? ☐ Yes ☐ No

16. When problems are located, does your organization provide information to the businesses/residents detailing the problem and the preferred methods of remediation? ☐ Yes ☐ No

17. Which of the following categories of people are represented in your organization as concerned citizens? (Please do not include individuals operating on an official basis)
    ☐ scientists ☐ teachers ☐ local home owners ☐ students
    ☐ special interest groups ☐ businessmen ☐ average citizens
    ☐ state government ☐ city/town government
    ☐ university personnel

18. Are any local businesses promoting the resource? (education and/or use) ☐ Yes ☐ No

19. How often does your organization receive media coverage?
    ☐ weekly ☐ monthly ☐ yearly ☐ event coverage only
    Which forms of media cover your activities?
    ☐ TV news ☐ radio ☐ newspapers

20. Does your organization encourage volunteers to participate in local or state environmental issues? (i.e. public hearings, letter writing, calling representatives, ect.) ☐ Yes ☐ No

21. How many times per year does the entire group meet:
    ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 11+
    At these meetings are volunteers encouraged to voice their concerns, comments, and ideas? ☐ Yes ☐ No

22. Is fostering public stewardship a goal of your program? ☐ Yes ☐ No

23. What is the primary focus of your monitoring activities:
    ☐ resource only ☐ resource and nearby lands ☐ watershed

24. Please rank numerically how important the following activities are to your program (1 being most important):
    - ___ assessing water quality conditions
    - ___ assessing habitat quality
    - ___ education (K-12)
    - ___ habitat restoration
    - ___ building community stewardship
    - ___ debris clean-up
    - ___ identification of pollution sources
    - ___ adult education
    - ___ other (please list) _____

25. Do you agree with our definition of "public stewardship"? ☐ Yes ☐ No
    If no, please make comments/changes on the back.

Return To: Christopher Damon, URI GSO, Coastal Resources Center, Narragansett, RI 02882
Fax: (401) 789-4670

☐ Please check here to receive a summary of the results

Appendix B

Reminder Letter

The University of Rhode Island, Narragansett, RI 02882-1197
Coastal Resources Center (401) 792-6224 Fax: (401) 789-4670

December 11, 1995

Dear Monitoring Program Coordinator:

We are happy to report that our study on volunteer monitoring programs and the evolution of public stewardship is now in progress, and the responses from the survey have been encouraging. However, we have still not received your response. Perhaps you mislaid the questionnaire, or your response was lost in the mail—any one of dozens of contingencies could have happened.

In any event, because your response is important to us and essential in completing this timely study, we have enclosed another copy of the questionnaire and our definition of what constitutes stewardship. We hope that you will find a few minutes in your busy schedule to check the appropriate boxes and drop the completed survey in the mail.

Our definition of stewardship is:

Public stewardship is the willingness of people to be liable for their actions and the resulting state of the surrounding resources. Public stewards recognize the societal obligations beyond their own short-term monetary interests, and have chosen to hold the world's resources in trust for future generations.

For the public steward, the boundaries of their community have been expanded to include the air, water, animals, plants, and soils. Value for a resource is calculated not through traditional economic means where commodities are bought and sold, but rather from the inherent value the resource possesses. Stewards understand that each element of an ecosystem is essential to the well being and natural functioning of the entire system, with the value of individual ecosystem components being derived from their contribution to the system as a whole.

Your time and effort are greatly appreciated.

Sincerely,

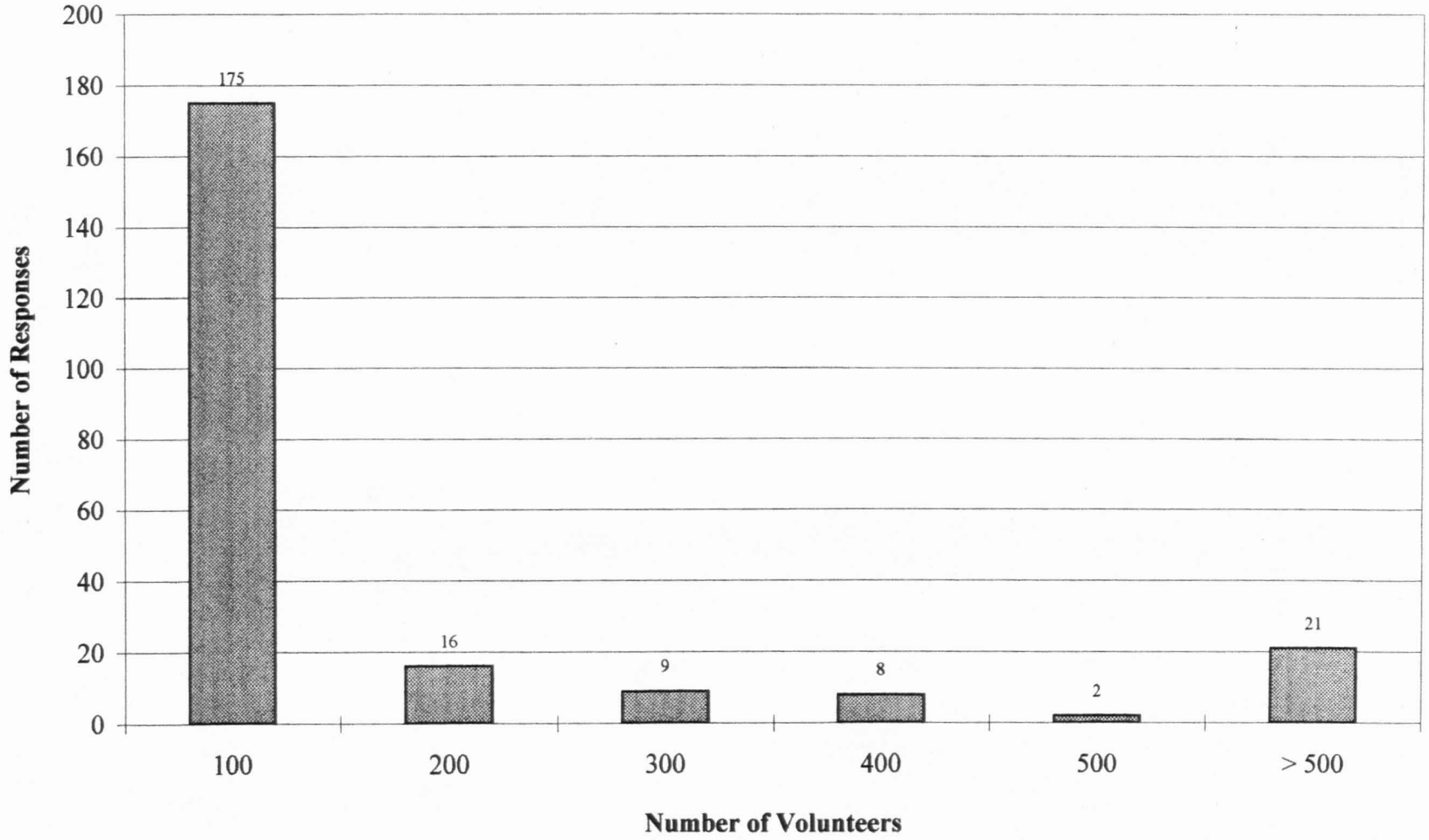
Christopher Damon

Appendix C

Organization Profiles

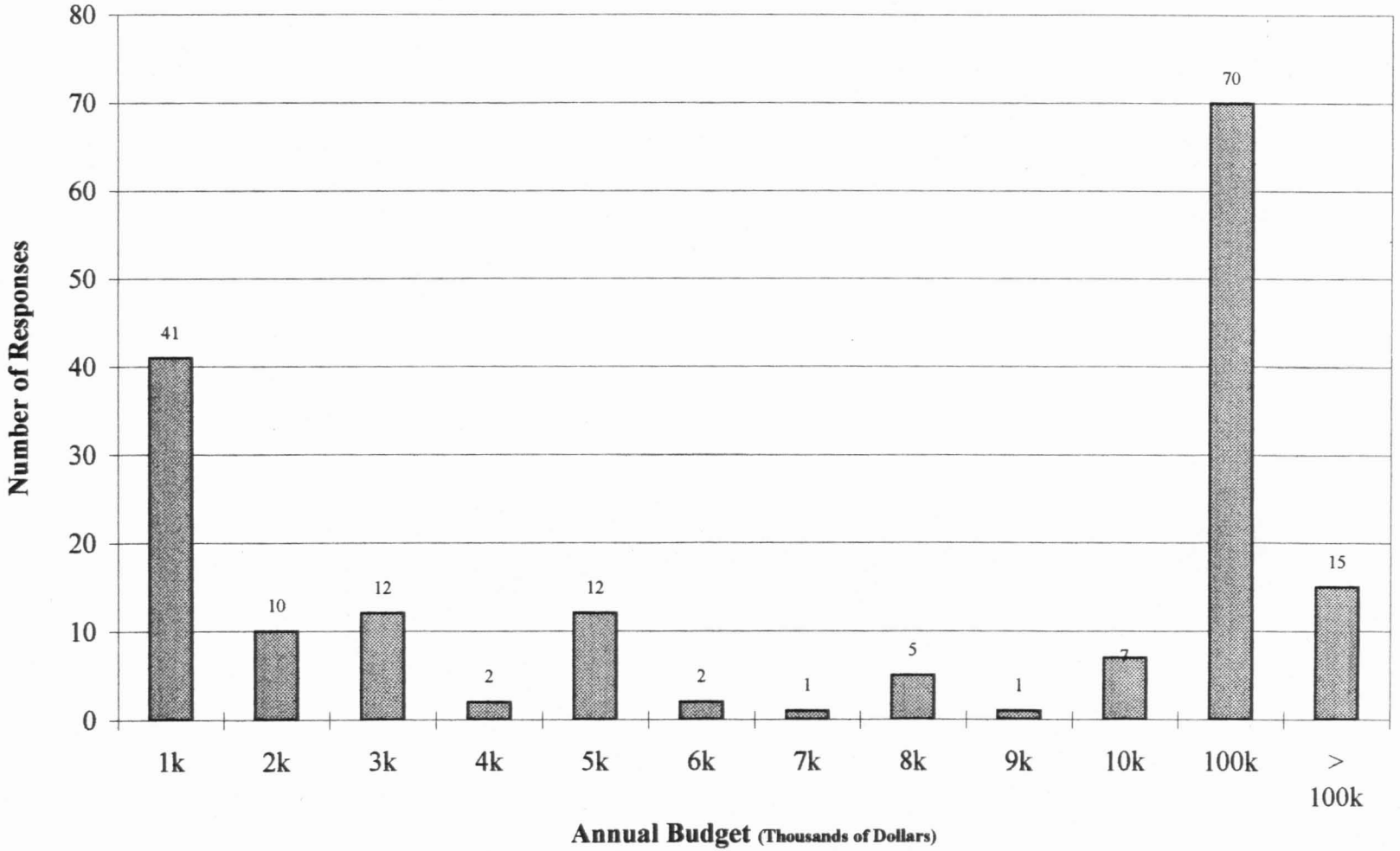
Volunteer Organization Profile

Number of Volunteers per Group (N=231)



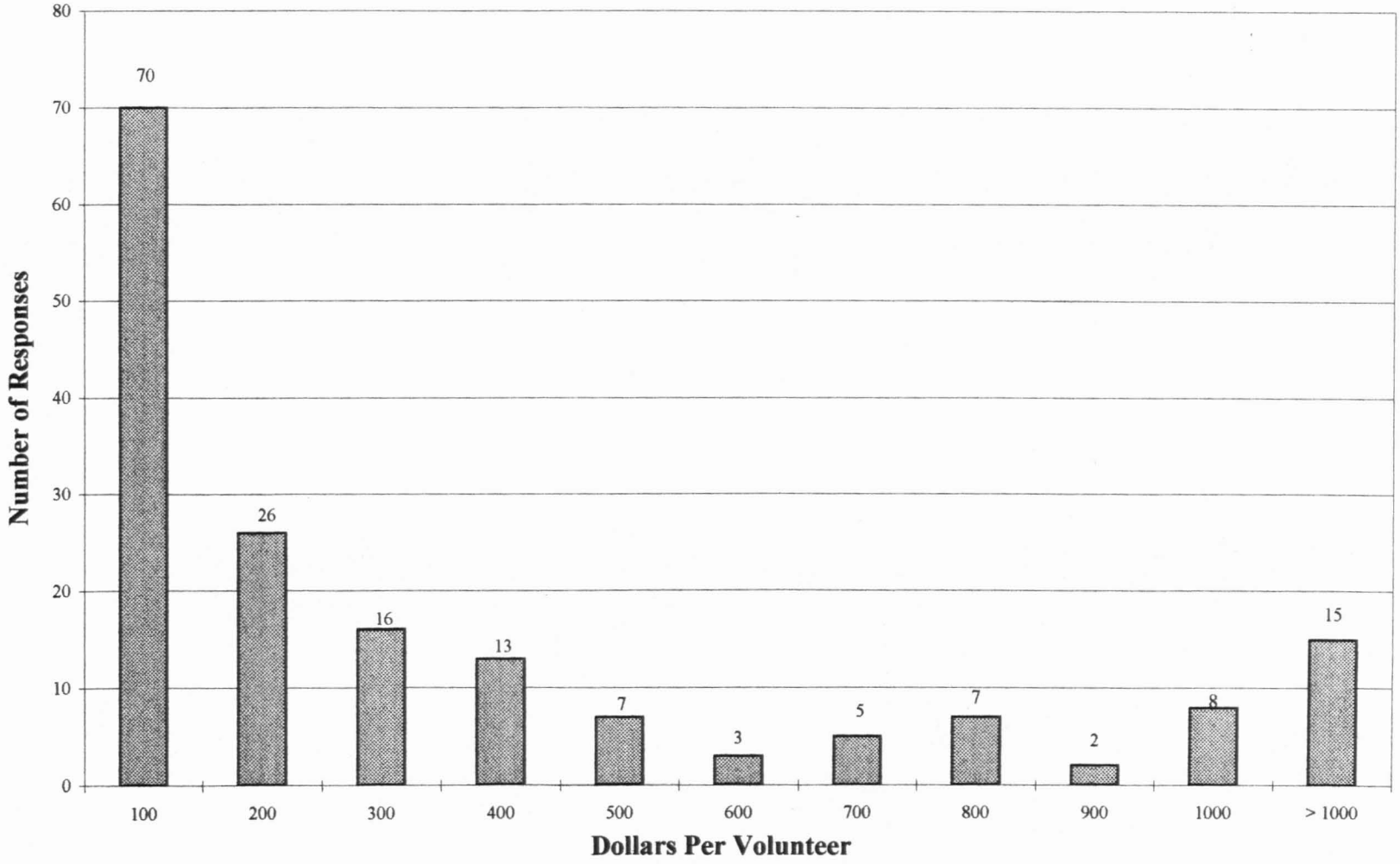
Volunteer Organization Profile

Budget Distribution (N=178)



Volunteer Organization Profile

Budget Dollars per Volunteer (N=172)



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